Summer 8-2015

School Psychologists' Training and Knowledge of Tourette Syndrome

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A Dissertation by

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Submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy in Education:

School Psychology

August 2015

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ACKNOWLEDGEMENTS

I have been very blessed to have met so many wonderful people at Chapman University. I am grateful to have been taught by Dr. Brady, Dr. Busse, Dr. Cardinal, Dr. Colbert, Dr. Hass, and Dr. Hunter, who love what they do and genuinely care for their students.

I would like to thank Dr. Brady for agreeing to be a part of my dissertation committee. He is the first person I met at Chapman University, and was the reason I chose to study there. Dr. Brady is such a wonderful professor and human being. I will always be grateful for his kind and supportive words before I had to take a leave of absence from the doctoral program. I want to thank him for his warmth and kindness.

I would like to thank Dr. Hunter for being so gracious in joining my committee on such short notice. She is such wonderful professor, as well as such a kind and caring person. She too had many kind and encouraging words for me during tough times and always welcomed me back when I attempted to complete the doctoral program.

I especially want to thank my dissertation chair, Dr. Busse, for agreeing to be my dissertation chair. He has pushed me and has helped me academically since I first sat in one of his lectures. Throughout my seven years on and off in the doctoral program, he has understood all of the ups and downs that happen throughout life, and always continued to encourage me to GBTW (get back to work)! I am also very grateful for the time he has taken in helping me get through the pre-dissertation process, as well as assisting me in completing my dissertation. He is such an intelligent person with a beautiful heart. Thank you so much for believing in me!

I would like to thank my sisters, Angelica Aguirre, Mariana Cornejo, and Sylvia Cornejo, for always giving and providing me the support necessary to continue the completion of my dissertation and encouraging me to continue, especially when I wanted to give up. I also want to thank them for their willingness to take care of my children in order for me to complete my dissertation. To my little brother, Adrian Cornejo, thank you for helping me understand the few articles I read that involved genetics. I'm pretty lucky to have such an intelligent brother.

I would like to thank my parents, Filiberto and Regina Cornejo, for their unconditional love and endless support in every aspect of my life. They have always made their family their first priority and have worked very hard to teach their children hard work, persistence, and humility. I also want to thank them for taking care of my little boys during the many countless hours I've spent working on my schoolwork, especially my dissertation. Les agradezco todo su apoyo en todos los aspectos de mi vida. ¡Los quiero mucho!

I want to thank Thomas Bañuelos for being the first person to encourage me to apply for my doctoral degree. He genuinely had faith in me and encouraged me to complete the program "no matter what happens." I would like to also thank him for reminding me that I **had** to graduate with my doctorate at the beginning of the dissertation process, the moments he's told me that he was proud of me, and the constant support and encouragement during these final months.

And last but not least, I would like to thank my two beautiful boys, Thomas and Francisco Bañuelos. My children have been the main reason that I have completed my

dissertation and I look forward to having them at my graduation ceremony. I want my little boys to learn that no matter what life brings; you never give up on your dreams.

ABSTRACT

School Psychologists' Training and Knowledge of Tourette Syndrome

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A web-based survey was conducted that included 97 practicing school psychologists in California. The results from the survey indicated that the majority (88%) of respondents were knowledgeable about Tourette Syndrome. Many respondents (28%) had never worked with a student with Tourette's, 20% had at least one case, and 52% indicated that they had worked with more than two cases in their careers as school psychologists. The majority of respondents indicated that their school psychology program did not adequately train them to assess or counsel students with Tourette's. The majority of participants also did not feel confident to work with students with Tourette's. As found in the study, school psychologists are in need of training to better serve children with Tourette Syndrome.

Children, whether diagnosed with Tourette Syndrome or not, may exhibit difficulties making academic progress because of tic related issues, as well as comorbid disorders such as Attention Deficit Hyperactivity Disorder (ADHD) and Obsessive Compulsive Disorder (OCD). Schools typically are where students spend many hours of their day, and where those who are knowledgeable about Tourette's can identify and provide needed supports depending on the student's needs. Therefore, school psychologists play a key role in facilitating proper education regarding Tourette's to

students, teachers, staff, and families, as well as providing academic, behavioral, emotional, and social support a student may need.

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Chapter I: Introduction

The purpose of this study was to investigate school psychologists' experience and knowledge of Tourette Syndrome (TS), which included their education and training related to the treatment of children with TS in the school setting. Following the gathering of this information, the data provide the reader with an understanding of the instruments used by school psychologists during the identification and assessment of TS symptoms, as well as interventions most commonly used by school psychologists.

Statement of the Problem

This study was important because it provided data for practicing school psychologists, as well as those in training programs, so that they may become aware of their strengths and weaknesses in their knowledge of TS and seek out training to help those who struggle with the symptoms of TS at school through research-based interventions. Also, this study provided school psychologists with knowledge of assessment procedures and tools used in school settings when conducting a psycho-educational assessment of TS.

Having this knowledge is important because it may not only support students with TS, but also provide information to teachers and staff who may be unaware of the syndrome but who have contact with the student. It is not only important to educate those teachers and staff who work with students with TS, it is equally important to educate students who come into contact with their peers with TS. Educating teachers, staff, and students may encourage and foster acceptance, tolerance, and support in the school community.

Research Questions

1. How much training on Tourette Syndrome do school psychologists receive in their training programs?
2. How knowledgeable are school psychologists regarding Tourette Syndrome?
3. What assessment methods do school psychologists utilize with students with Tourette Syndrome?
4. What interventions, if any, for Tourette Syndrome do school psychologists utilize in the school setting?
5. Is there a relationship between years of experience as a school psychologist and the number of cases of Tourette Syndrome or is there a relationship between years of experience and confidence working with students with Tourette Syndrome?

Significance of the Study

Tourette Syndrome is a complex neurological disorder that may have comorbid disorders such as Obsessive Compulsive Disorder (OCD) and/or Attention Deficit Hyperactivity Disorder (ADHD). Thus, this disorder may affect students behaviorally, academically, emotionally, and socially. Because TS can affect students in so many areas of their everyday life, it is important for education professionals to become aware of TS. School psychologists are critical school personnel who may provide support to teachers, staff, students, and student's families in educating them about TS and providing research-based interventions.

Unfortunately, not many school psychologists have adequate training to understand TS, know about the assessment of students with TS, and/or know of research-based interventions following the completion of their school psychology program.

School psychologists may not be given the opportunity within their district to become educated and/or trained about TS in depth. Therefore, school psychologists may not have the knowledge necessary to educate students, teachers, and staff about the disorder, provide research-based interventions, and may not be aware of adequate assessment tools available to assess students with TS.

Currently, there is minimal research regarding the training and knowledge of school psychologists who work with children with TS. This study explored the amount of training received by school psychologists in their school psychology program, as well as training received on the job. Questions relating to their understanding of TS, knowledge of best practices in the assessment of TS, and their level of expertise to provide research-based interventions were addressed. This study highlights the need for adequate training for future and current school psychology students, as well as practicing school psychologists in order to be prepared to provide the necessary support for students with TS. This study is not solely directed towards school personnel; this study is also for current researchers of TS. The results of this study may provide information to researchers regarding the need for more research on interventions for TS in the schools, as well as literature directed towards school psychologists and their role as mental health providers.

Chapter II: Literature Review

The purpose of this chapter is to provide a comprehensive review of the literature relevant to the current study. The topics that comprise this review include the clinical discovery of Tourette Syndrome (TS), its characteristics, etiology and prevalence, as well as clinical treatment, and the role of the school psychologist through school-based interventions and assessment.

Literature Search

The literature included in this chapter was located using the Chapman University library website (http://www1.chapman.edu/library/). *Discover!,* the search engine embedded into the Chapman University library website, was used to search for books and peer reviewed journal articles. This search engine was also used to search specific journal articles published between 1881 and 2015. The specific search sites were Educational Resources Information Center (ERIC), PsycARTICLES, and PsycINFO databases using a combination of the following descriptors: Tourette syndrome, Gilles de la Tourette, Tourette Syndrome and school psychologists, Tourette Syndrome and school based interventions, Tourette Syndrome and genetics, Tourette Syndrome and treatment, habit reversal training, Tourette Syndrome and assessment, achievement outcomes, pharmacology and Tourette Syndrome, and medication and Tourette Syndrome. Manual searches also were performed in the following journals: *School Psychology Review, Comprehensive Psychiatry, Psychological Assessment, Journal of Applied Behavior Analysis, Journal of School Psychology, Journal of Applied School Psychology, Contemporary School Psychology, Journal of Psychoeducational Assessment, Journal of*

Special Education, Journal of the American Academy of Child & Adolescent Psychiatry, Journal of Neuroscience, and *Applied Neuropsychology*. The reference sections of individual articles were also searched to identify additional primary and secondary sources of relevance to the present study. *Google Scholar* was also used to search for articles relevant to the study using the descriptors mentioned.

Clinical Discovery of Tourette Syndrome

Tourette Syndrome (TS) is a complex hyperkinetic neurodevelopmental disorder, which is characterized by involuntary motor and/or vocal tics. The first clinical description of this syndrome occurred in 1825 by Jean-Marc Gapard Itard, the Chief Physician at the National Institute for Deaf-Mutes in Paris, who studied 10 individuals with TS symptomology (Newman, 2006; Newman, 2010). Itard described individuals with TS as follows: "When the muscles which animate our lives are no longer controlled by the will, because of morbid stimulus provokes contractions and produces convulsions, these violent and repetitive movements are especially disorganized, tumultuous, and *nonfunctional"* (Newman, 2006, p. 339). His observations indicated that individuals with the disorder did not have the will to control their own movements. Itard described unplanned and involuntary facial expressions, bodily movements, and vocalizations. Co-morbidity, with then unknown disorders, was also described such as Obsessive-Compulsive Disorders (OCD), Attention Deficit Hyperactivity Disorder (ADHD), self-injurious behaviors, and emotional distress (Newman, 2006). Despite having the first clinical description of TS, Newman (2010) indicated that at the end of Itard's study, the goal was not to name the syndrome that ailed his patients, but rather to examine the symptoms, origins, and treatment.

Georges Gilles de la Tourette, a French neurologist, after whom the syndrome is named, was the second to document his observations and description of involuntary vocal and motor movements. In 1885, after working with 9 individuals who presented with TS, Gilles de la Tourette wrote an article about their different symptoms. Lajonchere, Nortz, and Finger (1996), who translated Gilles de la Tourette's 1884 article, indicated that Gilles de la Tourette believed that TS was manifested in childhood and was hereditary. Even though he did not think that the syndrome affected the senses or the intellect, Gilles de la Tourette apparently believed that TS was incurable.

Since the *discovery* of TS in the 18th century, there have been different theories regarding the cause of TS. For example, in 1973, Logue, Platzek, Hutzell, and Robinson reported on literature from the 1960's hypothesizing that organic changes in the brain caused TS as a result of surgery, moving to a new school, or a birth of a sibling. In the past 25 years, TS is no longer a subject of speculation, but rather, a much better understood neurological disorder.

Tourette Syndrome

Tourette syndrome (TS), which the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) now designates under Tic Disorders, is a neurological disorder of genetic origin with neurotransmitter abnormalities (Singer, 2005). Tourette syndrome is characterized by multiple motor and phonic tics that are involuntary and change over time. According to the American Psychiatric Association (APA), tics are defined as "sudden, rapid, recurrent, nonrhythmic motor movements or vocalizations" (2013, p. 82). In the DSM-5, there are three separate diagnoses related to TS (e.g.,

Tourette's Disorder, Persistent (Chronic) Motor or Vocal Tic Disorder, and Provisional Tic Disorder), each with its own specific criteria.

According to APA (2013) criteria, in order for someone to be diagnosed with "Tourette's Disorder" they must meet the following criteria: (a) Both multiple motor and one or more vocal tics have been present at some time during the illness, although not necessarily concurrently; (b) the tics may wax and wane in frequency but have persisted for more than one year since first tic onset; (c) onset is before age 18 years, and (d) the disturbance is not attributable to the physiological effects of substance (e.g., cocaine) or another medical condition (e.g., Huntington's disease, postviral encephalitis). Similar criteria are needed in order for the diagnosis of Persistent (Chronic) Motor *or* Vocal Tic Disorder, except that the individual has either single or multiple motor or vocal tics, but not both multiple motor *and* one or more vocal tics, as in the Tourette's Disorder criteria. The "motor tics only" or "vocal tics only" specifier is only required for persistent (chronic) motor or vocal tic disorder. According to Hallett (2015), the Provisional Tic Disorder diagnosis is the most common, and consists of the following: (a) single or multiple motor and/or vocal tics, (b) the tics have been present for less than one year since the first onset, (c) onset is before age 18 years, (d) the disturbance is not attributable to the physiological effects of a substance (e.g., cocaine) or another medical condition (e.g., Huntington's disease, postviral encephalitis) and, (e) criteria have not been met for Tourette's Disorder or Persistent (Chronic) Motor or Vocal Tic Disorder.

Characteristics of Tourette Syndrome

Tourette Syndrome is characterized by motor and vocal tics, which range in severity. Tics wax and wane throughout the life of the person (Jimenez-Jimenez &

Garcia-Ruiz, 2001; Leckman, 2002) and often occur in discrete bouts over the course of the day once they are established. According to Peterson and Leckman (1998), tics occur in briefly stable intertic intervals (measured in seconds or fractions of seconds), typically 0.5 to 1.0 seconds, and interbout intervals, which are tics measured in minutes to several hours throughout the day. Individuals with TS often have tics that develop and become part of their daily bouts, but later have new tics that develop, which are observed to replace the old tics (Zinner, 2000).

Simple motor and vocal tics are those that occur briefly, with rapid movement. Simple motor tics include symptoms such as eye blinking and shoulder shrugging, and simple vocal tics includes symptoms such as throat clearing and sniffing. Complex motor and vocal tics last longer (seconds) and include a combination of the simple motor and vocal tics, such as throat clearing and shoulder shrugging. According to the APA (2013), there are purposeful complex tics, such as tic-like sexual or obscene gestures (copropaxia), or a tic-like imitation of someone else's motor movements (echopraxia). There are different vocal tics that are present in TS, which include the repetition of the individual's own speech (palilalia), repetition of someone else's speech (echolalia), and the most well known feature of TS, coprolalia (Stern, 2014), which is swearing, but may also include saying things that are culturally taboo, socially unacceptable or inappropriate. Only 10% of individuals with TS manifest coprolalia, which is described as the most distressing and recognizable symptoms of the disorder (Leckman, 2002; Singer, 2005; Swain, Scahill, Lombroso, King, & Leckman, 2007).

More than 90% of adults and 37% of young children experience premonitory sensations prior to motor and/or vocal tics (Singer, 2005). Premonitory sensations are

defined as an itch, urges, impulse, tension, tingles, or pressure that individuals with TS experience. Steinberg et al. (2010, p. 278) indicated, "Many patients describe accompanying sensory phenomena preceding the tics, which are often described as aversive or unpleasant."

Tics can be suppressed, however, premonitory urges can build up after tics are suppressed, causing discomfort (Cohen, Leckman, & Bloch, 2013). In order to relieve these premonitory sensations, individuals with TS will have involuntary tics. Singer suggested, "the recognition that tics may be a voluntary response to an involuntary sensation . . ." which has lead researchers to " . . .classify tics as 'unvoluntary' rather than involuntary" (2005, p. 249). Researchers have speculated that there is a lower percentage of self-reporting among children having premonitory urges because they perhaps do not know how to articulate their symptoms. According to Steinberg et al. (2010) and Woods, Piacentini, Himle, and Chang (2005), even though younger children may experience premonitory urges, those urges are not associated with tics until later in development, which is usually after 10 years of age. According to Cohen et al. (2013) premonitory urges and somatic hypersensitivity are just as distressing as the tics of individuals with TS.

Motor and phonic tics change with time and can become more pronounced depending on the individual. The first sign of tics are usually motor tics, with periods of eye blinking and other facial features, and phonic tics such as repetitive bouts of sniffing and throat clearing (Leckman, 2002). The actual age ranges of tic onset vary depending on the source. According to Leckman, King, and Bloch (2014), APA (2013), and Leckman (2002), the onset of tics is typically between 4 and 6 years of age, although

Stern (2014) indicated that onset occurs between the ages of 5 to 7. Laschou, Dermanopoulou, Marmangelou, and Papaspyrou (2015) reported that onset occurs between the ages of 6 to 12, and Swain et al. (2007) reported that motor tics appear before vocal tics between the ages of 3 and 8. Freeman, Fast, Burd, Kerbeshian, Robertson, and Sandor (2010) reported the mean age of tic onset as 6.4 years. There is no specific age range in regards to the onset of chronic combination of motor and phonic tics, but it typically occurs under the age of 18 (Stern, 2014).

According to Singer (2005), maximum tic severity is between the ages of 8 to12 years of age, following a steady decline in symptomology. However, tics that persist into adulthood can be associated with the most severe symptoms such as intense episodes of self-injurious motor tics which may include self slapping, lip biting, and scratching off wounds (Lashcou, Dermanopoulou, Marmangelou, & Papaspyrou, 2015) and socially unacceptable corprolalic utterances or gestures (e.g., shouting, obscenities, racial slurs, and gestures), which occur in 10% of individuals with TS (Leckman, 2002; Singer, 2005; Swain et al., 2007). There is a marked reduction in the severity of tics by the second decade of an adolescent's life. Bloch et al. (2006) and Pappert, Goetz, Louis, Blasucci, and Leurgans (2003) reported that a marked decrease and complete remission of tics occur in one half to two thirds of children by the end of adolescence.

There are, however, cases of adult onset of tic disorders. According to Singer (2005), adults with late onset of tic disorders are commonly associated with potential environmental triggers. Those with a late onset of tic disorders have severe symptoms, which cause social morbidity such as self-injurious behaviors (e.g., mutilation, head banging, and trichotillomania), and may have very poor responses to medication.

Tourette Syndrome is characterized by multiple motor and phonic tics that are involuntary and change over time. In terms of body location, number, frequency, complexity, intensity or forcefulness, and noticeability, tics occur differently for every individual. Because of these differences, the resulting social consequences can also vary considerably (Himle et al., 2006). Tics change depending on a person's age and are often exacerbated by stress (Leckman, 2002). Emotional upset, such as anxiety, excitement, anger, and fatigue have been noted to exacerbate tics (Leckman, Bloch, Scahill, & King, 2006). In contrast, when a person is involved in activities, concentrating, is being pleased, or is asleep, their tics tend to subside (Singer, 2005).

Prevalence

Recent studies have reviewed an increase in the occurrence of the diagnosis of TS due to an awareness of not just complex tics, but simple tics (i.e., eye blinking, throat clearing). According to Scahill and Ort (2004), there is a 1 to 4% prevalence rate in the population for chronic motor tic disorders, and a higher percentage for transient tics with a prevalence rate of 10 to 15%. A national survey in the United States estimated 3 to 8 per 1,000 in school-aged children have TS, with lower frequency of cases with African American and Hispanic Americans (APA, 2013; Robertson, Eapen, & Cavanna, 2009). Scahill, Bitsko, Visser, and Blumberg (2009) reported that lower frequency of cases reported might be due to the biological risk and access of care. It should be noted that, due to limited data, the prevalence rates and differences among, race, ethnicity and/or culture have been found to vary within available studies.

According to McNaught and Mink (2011), individuals with TS have been identified in every country and geographic area, affecting all ethnic groups. There is

evidence of common features of TS in all races and cultures with a prevalence rate of 3 to 5 per 10,000 people worldwide (Singer, 2005; Vogt & Carroll, 1999; Wigley, Mason, Lambert, Collins, Lask, & Christie, 2000). Worldwide, 1% of children between the ages of 5 to 18 are reported to have TS (Kimber, 2010; McNaught & Mink, 2011; Robertson, 2008b, Robertson & Chowdhury, 2011; Stern, 2014). As of 2007, the Tourette Syndrome International database Consortium (TIC) had information about cases in different parts of the world. According to Freeman (2007), there were 15 reported cases in Africa, 229 cases in Asia, 183 cases in Australia, 1,888 cases in Europe, 273 cases in the Middle East, 156 in South America (including Mexico), and 4,061 total cases in North America, which only included the United States and Canada but did not include Mexico.

Currently, there is limited evidence regarding gender differences in regards to the type, severity, or range of tics. Some research has indicated that males tend to be more susceptible to TS symptomology than females (Robertson, 2007), and that there may be a 4:1 ratio between males and females, (Robertson, 2008a). However, according to Steinberg et al. (2010), the ratio is reported as 2 males to 1 female with TS. As with race/ethnicity and other prevalence rates the data regarding gender ratios between males and females varies among studies. More research is needed to better understand the prevalence of TS.

Etiology of Tourette Syndrome

In the 18th century, Itard and Gilles de la Tourette observed several patients with TS symptomology. Even though Gilles de la Tourette indicated that TS was hereditary, researchers before the late 19th century were not aware of the actual neurological cause of the disorder due to limited empirical scientific evidence. Current research within the

scientific community has indicated that genetics and abnormalities in neurobiology and neurochemistry may be the causes of TS symptomology. This information has come to light through postmortem studies, as well as studies using technology such as magnetic resonance imaging (MRI), electroencephalography (EEG), and positive emission topography (PET). However, the actual etiology of TS is still unknown.

Genetics. Genetics and neurobiology are the two areas of greatest focus in the study of the etiology of TS. Heredity, based on twin studies, indicated a genetic component to TS (Paschou, 2013). According to Singer (2000) and Wodrich (1998), twin studies demonstrated a concordance rate of 80 to 86% in monozygotic twins, even dizygotic twins had a concordance rate of 20 to 25%. The phenotype may be determined for TS by genetic and unique environmental factors (Haan, Delucchi, Mathews, & Cath, 2015). A phenotype is an individual's noticeable traits (e.g., eye color, height, hair color). More recent research indicated that 8% to 57% of parents of children with TS had a history of tics (Eysturoy, Skov, & Debes, 2014).

According to Robertson (2000), despite no specific identifiable gene, studies have shown that the majority of cases are inherited. In 2005, an individual with TS was identified as having a frameshift gene mutation due to a single-base chromosome deletion of SLITRK1, which may indicate that a single gene defect may account for some individuals with tics (Dooley, 2006).

The SLITRK1 gene is a member of the SLIT and TRK family of proteins (Karagiannidis, et al., 2012). Proteins in this family are found in the brain, where they play a role in the growth and development of nerve cells. According to Karagiannidis et al. (2012, p. 666), the SLITRK1 "has been shown to control neurite outgrowth and it is

expressed in the embryonic and postnatal brain, including the cortex, thalamus and the basal ganglia, reflecting the neuroanatomical regions most commonly implicated in TS." In order to allow each nerve cell to communicate with nearby cells, the SLITRK1 gene may help guide the growth of specialized extensions (axons and dendrites), which perhaps, decreases the amount of communication between the basal ganglia and other related neurological structures controlling movement. A study by Paschou (2013, p. 1032) "suggests that the role of SLITRK1 in TS etiology may have been previously under-appreciated, and the LD structure of the region indicates a possible involvement of SLITRK1 regulatory variants in TS etiology" (Karagiannidis et al., 2012, p. 667).

According to Dooley (2000), genetic factors alone do not explain the etiology of TS, but rather environmental factors may play a large role. Environmental factors may include pre- and perinatal difficulties, head injury, and infections with varicella, herpes simplex, HIV, mycoplasma pnuemoniae, and Lyme disease. Prenatal exposure to medication or illicit drugs, infections (e.g., streptococcal), low birth weight, and maternal emotional stress are other possible environmental factors that may be linked to the development of TS (Singer, 2000).

Neurology and pathophysiology. Although very little information is available regarding the genetics of TS, there are several studies regarding neurobiological differences in the brain of someone with a tic disorder. According to Buse, Schoenefeld, Münchau, and Roessner, "TS is commonly understood as a disorder of dysbalanced or overactive dopaminergic neurotransmission system" (2013, p. 1071). Dopamine (DA) is one of a group of chemicals called neurotransmitters, which carry information from one neuron to another. This chemical acts in the brain to influence a wide range of behaviors,

including paying attention, planning, and moving the body. DA is particularly involved with movement selection, reward-driven learning, response inhibition, and temporal processing, indicating that it is involved in many motor functions (Buse et al., 2013; Hershey, et al., 2004; Liang et al., 2008; Richard & Berridge, 2011). According to Ganos, Roessner, and München (2013), DA has an important influence in neurotransmission in the frontal-subcorticol circuits, which are the areas in the brain that are hypothesized to be involved with TS symptomology.

It appears that not only DA is involved in the manifestation of tics but also other neurotransmitters (Cummings & Frankel, 1985; Dedmon, 1990). The neurotransmitter serotonin (5-HT) may be involved in the manifestation of tics in TS. Serotonin is a neurotransmitter that sends information from one neuron to another, which is manufactured and used in the brain, but is mostly found in the gastrointestinal tract. It is believed to play a role in mood balance.

Dopamine and serotonin transporters (DAT and SERT) are monoamine neurotransmitter transporters, which participate in the metabolism of DA and 5-HT, respectively. More specifically, DAT is a membrane protein that removes DA from the synaptic cleft and deposits it into surrounding cells, which then terminates the signal of the neurotransmitters. Similarly, SERT removes 5-HT from the synaptic cleft back into the chemical synapse, terminating the effects of serotonin and simultaneously enabling its reuse by the presynaptic neuron.

According to Buse et al. (2013), lower levels of DAT expression, or neuronal activity, compared to that of SERT, which has a higher expression, may be the cause of motor and vocal tics. Possible pathophysiological mechanisms of TS, according to a

study conducted by Jijun et al. (2010), could be that lower expression of DAT and a higher expression of SERT may influence an increase in DA content and decreased 5-HT levels in the striatum, which is a component of the basal ganglia and is comprised of the caudate nucleus, putamen, and the nucleus accumbens (Martin, 2003).

There are many theories regarding the causes of TS, but not all structural brain studies in children and adults are generally accepted because of different sample sizes, variable individual characteristics (e.g., age, gender, differing comorbid disorders and/or medications treating comorbid disorders) (Ganos, Roessner, & Münchau, 2013; Paschou, 2013). According to Miller et al. (2010), when the anatomical and functional structure of the cortico-striato-thalamo-corticol (CSTC) circuits is disturbed, TS is present. Thus, studies of individuals with TS show structural changes within the thalamus and basal ganglia. According to Miller et al. (2010), an integral component of the CSTC circuits is the thalamus, which is hypothesized to be involved in the onset of tic symptoms and associated compensatory responses. The basal ganglia are involved in motor, cognitive, and emotional functions (Martin, 2003). Within the basal ganglia are the caudate and putamen, which are called the neostriatum or striatum. The caudate nucleus plays a vital role in eye movement and how the brain learns, specifically in storing and processing memories, and the putamen is involved in the movement of the limb and trunk of the human body (Martin, 2003). Medial to the putamen is the globus pallidus, which together form the lentiform nucleus. The globus pallidus consists of striatal neurons that contain gamma-aminobutyric acid, which is also known as GABA (Arslan, 2001). GABA is a neurotransmitter that has inhibitory effects on neuronal functioning.

Eddy, Rizzo, and Cavanna (2009) explained that the left side of the basal ganglia in persons with TS shows a decrease in volume of the left side of the caudate nucleus, putamen, and globus pallidus, as well as a decrease in striatal metabolism. A decrease in striatal metabolism means that there is a decrease in the neuronal activity. According to volumetric MRI studies, Müller et al. (2009) reported that there was a reduction of normal volumes of the basal ganglia with or without basal ganglia asymmetry, which is influenced by numerous factors such as age, TS symptoms and severity, gender, co-morbidity, streptococcal infections, and neuroleptic (antipsychotic) medication.

Abnormalities in several neurochemical systems have been identified, including dopamine. These claims are evidenced by "observation of benefits derived from medications, post-mortem studies, and metabolite analysis" (Adams, Troiano, & Claine, 2004, p. 1496). According to Robertson and Chowdhury (2011), tic disorders are caused by an imbalance of dopamine pathways in the brain, which "mostly likely" involve the basal ganglia. The CSTC circuits have a variety of different neurotransmitters, which includes the excitatory neurotransmitter glutamate. Glutamate is considered to be the major mediator of excitatory signals in the mammalian central nervous system and is involved in most aspects of normal brain function including cognition, memory and learning. Familial genetic studies and reduced postmortem levels of glutamate in the globus pallidus and substantia nigra pars reticulata additionally support the possible role of the glutamatergic system in TS (Lemmon, 2015). The substantia nigra, which means "black substance" in Latin, because of its high levels of neuromelanin in dopaminergic neurons, causing it to appear darker than neighboring areas, plays an important role in reward, addiction, and movement (Martin, 2003). The substantia nigra pars reticulata is a

part of the substantial nigra and is one of the three nuclei on the output side of the basal ganglia. The substantia nigra pars reticulate is partly where neurons that contain GABA are housed, and are primarily projected to the thalamus (Martin, 2003).

Comorbid Disorders

Worldwide, 88% of individuals with TS are reported to experience comorbidity with other disorders. The most common was 60% with ADHD and 59% with OCD (Robertson, 2006; Robertson, Eapen, & Cavanna, 2009). Significant behavior and other symptoms that are associated with TS include specific learning disabilities, phobias, mood disorders, antisocial behavior, aggressiveness, self-injurious behaviors, sleep disorders, anxieties, and (Freeman, 2007; McNaught & Mink, 2011; Staley, Wand, & Shady, 1997). According to Steinberg et al. (2013), during the course of TS, symptoms appear sequentially and may be more debilitating than the actual tics, because the individual with TS may focus on the tics due to negative emotions, possibly causing anxiety and inattention.

A comorbid disorder with TS can be categorized in one of three ways: (a) a genetically associated disorder, (b) a primary co-occurring disorder, or (c) a secondary consequence of TS (Gaze, Hayden, Kepley, & Walkup, 2006). Associated symptoms such as depression, anti-social behaviors, and/or aggressive behaviors may be exacerbated by a person's meta-cognitive understanding of the symptoms of TS, as well as the social stigma related to tics, similar symptoms may be organic in nature. According to Steinberg et al., "Patients' beliefs and expectations (cognitions) about their illness or somatic symptoms play an important role in the impact of the illness or symptom(s) on their life" (2010, p. 463).

Tourette Syndrome and Attention Deficit Hyperactivity Disorder. Attention Deficit Hyperactivity Disorder is a neurodevelopmental disorder, which APA (2013) defined as a disorder impairing levels of inattention, disorganization, and/or hyperactivity-impulsivity. To be diagnosed with ADHD, an individual must have symptomology present in two or more settings before the age of 7. Over 50% of children with TS are diagnosed with ADHD, which may overshadow a child's tics due to disruptive or inattentive behaviors (Zinner, 2000). The onset of tics most commonly occurs following ADHD symptoms (Freeman, 2007; Leckman, 2002; Roessner, Becker, Banaschewski, Freeman, and Rothenberger, 2007). Lack of peer acceptance in children with TS is more likely because of tics than it is because of ADHD (Bawden, et al., 1998). Cohen, Leckman, and Bloch (2013) suggested a prompt screening for ADHD symptoms in order to alleviate the possibility of poor academic and social impairment.

Robertson (2000) suggested that TS and ADHD are highly associated by genetic similarities. According to Gaze, Kepley, and Walkup (2006), due to the way TS and ADHD interact, there is greater overall impairment with the combination of both disorders rather than ADHD alone. Roessner, Becker, Banaschewski, Freeman, and Rothenberger (2007) expanded on this theory by explaining that there is more impairing impact on individuals' functional capacity and overall quality of life if ADHD is present than with TS alone.

Aside from TS and ADHD potentially being genetically related, there are three other possibilities as to the nature of the relationship between disorders. According to Robertson (2000), the second possibility is that there may be two types of individuals with TS plus ADHD, one in whom ADHD is secondary to TS, the third possibility is that

pure ADHD and TS plus ADHD are different phenomenologically, with an unclear relationship, and a fourth possibility is that individuals with TS have reduced attention and impulse control, poor concentration, but at a lower threshold than that of a DSM-5 diagnosis for ADHD.

Tourette Syndrome and Obsessive Compulsive Disorder. Robertson (2000) characterized Obsessive Compulsive Disorder (OCD) as persistent obsessions with recurrent, intrusive, senseless thoughts, which are internally uncomfortable and/or compulsions with repetitive and seemingly purposeful behaviors that are performed according to certain rules or in stereotypical fashion. Individuals with TS have greater prevalence of symmetry obsessions, and counting, repeating, ordering, and arranging compulsions than pediatric onset of OCD patients without comorbid tic symptoms (Leckman, King, & Bloch, 2014). A prevalence rate of OCD is reported to be 0.05% of the general population, and 40% to 60% of individuals with TS have been reported to have OCD symptomology (Cath, et al., 1999; Leckman, King, & Bloch, 2014; Robertson, 2000). The rates of OCD are considerably higher in individuals with TS, with increased frequency and persistence as they get older (Bloch, et al., 2006). A study by Eysturoy, Skov, and Debes (2014) found in a sample of 314 children with moderate to severe OCD, that OCD affected 5% of TS without genetic predisposition, with 12% of children with genetic transmission from one side of the family, and 37% of genetic contributions from both sides of the family.

Tourette Syndrome and Cognition. According to Wagner (1970), people with TS demonstrated various intelligence quotients (IQ) a standard score of 88 and 142 (upper low average to superior range). However, more current research indicated that

individuals with TS generally fell within the normal range of IQ, with 2 to 11 points lower nonverbal IQ compared to verbal IQ (Shaw, Woo, & Valo, 2007). The literature indicates that impaired performance on neuropsychological tasks is correlated with the presence of tics, especially when there are symptoms related to ADHD and/or OCD (Singer, Schuerholz, & Denckla, 1996). Moreover, according to Gorman et al. (2010), Lebowitz et al. (2012), and Pringsheim et al., (2009) individuals with TS with comorbid ADHD and OCD have been shown to have poorer global or psychosocial functioning compared to individuals without comorbid ADHD and OCD. In contrast, Robertson (2006) indicated that there is a correlation between increased OCD severity and an increased IQ.

Learning disabilities are also associated with TS, especially in the areas of math and written language, with a comorbidity rate of 23% as reported by Freeman, Fast, Burd, Kerbeshian, Robertson, and Sandor (2000). One third of children with TS have been found to have learning disabilities (Golden, 1984; Kauffman & Kerbehsian, 1992). According to Debes, Lange, Jessen, Hjalgrim, and Skov (2011), several researchers have found different learning related issues for persons with TS such as difficulties in the areas of visual-spatial skills, psychomotor skills, sensory and perceptual functioning, short-term memory, nonverbal memory, visual attention span, complex abstract reasoning, and numerical reasoning. However, caution should be exercised in assessing a child's skills based on timed testing, given that studies by Harris et al. (1995), Osmon and Smerz (2005), Schuerholz et al. (1996), and as Singer, Schueroholz, and Denckla (1995) indicated a slower reaction time and difficulty in speedy execution of movement for individuals with TS.

Assessment of Tourette Syndrome

Staley, Wand, and Shady (1997) reported that, as recently as the1980's, psychiatrists in many countries were baffled by TS and did not properly diagnose patients. Rivera-Navarro, Cubo, and Almazán (2009, p. 18) reported, "According to physicians, a diagnosis of TS was difficult to make due to the complexity of symptoms, as these are easily confused with symptoms that also pertain to other diseases which are mainly psychological, such as hyperactivity, depression, anxiety, or behavioral disorders."

Due to the complexity of TS, Plessen (2013) suggested that a diagnostic workup requires cooperation within disciplines. Medical professionals are the individuals who should diagnose TS, taking into account the perspectives of parents, teachers, and other individuals who are in close contact with the patient. However, according to Dooley (2006), the medical doctor is less likely to observe tics because patients tend to suppress them throughout consultation. Thus, the diagnosis is dependent on the history of the child and the family.

The current diagnosis for TS is based on the criteria proposed by the DSM-5. However, there is a somewhat different criterion from the *International Classification of Disease and Related Health Problems, 10th Revision* (ICD-10) and in the Classification of Tic Disorders by the Tourette Syndrome Classification Group (Dooley, 2006). According to the European guidelines for the diagnosis of TS, standardized diagnostic tools are recommended, such as the semi-standardized interview *Kiddie-Schedule for Affective Disorders and Schizophrenia* (K-SADS) (Plessen, 2013). This tool can be used

as a screener for other psychiatric disorders in the general evaluation of both children and adults. It allows for detecting possible aspects of TS, as well as comorbid conditions.

In 1989, Leckman et al. developed the *Yale Global Tic Severity Scale* (YGTSS), due to a limitation in instruments specifically targeted to assess TS (Storch et al., 2005). Plessen (2013) indicated that the YGTSS is the most widely used instrument for tic disorders in clinical settings, as well as for research purposes. The YGTSS is a semi-structured clinician scale that measures the severity of motor and/or vocal tics over the previous week. This instrument gathers parent and child reports and behavioral observations, providing five index scores, which include Total Motor Tic Score, Total Phonic Tic Score, Total Tic Score, Overall Impairment Rating, and Global Severity Score. Interpersonal, academic, and occupation distress and impairment can also be rated with a use of a separate rating on the YGTSS.

The *Tourette's Syndrome Severity Scale* (TSSS) was first created by Shapiro and Shapiro (1984). This instrument is a rating scale completed by patients and/or people associated with the patient (e.g., parent), which measures the numbers of tics noticed, are commented on, are seen as odd, and the degree of impairment. According to Cohen et al. (2013), this measure is reliable and has a short administration time. However, it focuses primarily on the social impact from tics and not the severity of the tics themselves.

In 2005, Chao and See developed the *Stress Index for Children or Adolescents with Tourette Syndrome* (SICATS) (Chao, Wang, H., Chang, Wang, Y., & See, 2010). The SICATS is a semi-structured interview, which has 26 items and can be completed within 10 to 20 minutes. There is a caregiver version as well as a patient version of the

SICATS, which measures the stress of the individual with TS. According to Chao et al. (2010), the SICATS is a reliable and valid instrument.

According to Cohen et al. (2013), the *Tourette's Disorder Scale-Clinician Rated* (TODS-CR) and the *Tourette's Disorder Scale-Patient Rated* (TODS-PR) are instruments rated by the clinician with the use of a semi-structured interview of the parent and child, and the parent rates their child, respectively. Both the TODS-CR and TODS-PR identify motor and phonic tics as well as comorbid conditions, which include OCD, ADHD, aggression, and emotional disturbances. The strength of this instrument is that it provides ratings for comorbid behavioral symptoms, but there is no update of severity ratings as classified under the current DSM-5.

The *Hopkins Motor and Vocal Tic Scale* is designed to gather information by family members and observer(s), which separately rank the individual with possible TS. The scale measures the overall severity of each individual tic on a visual scale. The *Hopkins Motor and Vocal Tic Scale* is easy to administer and improvement of tics can be followed separately. However, the data gathered by this scale are difficult to aggregate across patients, and it does not have separate measures for frequency, intensity, and interference from tics (Cohen, et al., 2013).

The *Tourette Syndrome Questionnaire* is a thirty-five page self-report involving both the parent and child. It gathers information related to prenatal and developmental history, family history, as well as tic history. This questionnaire is helpful in identifying potential risk factors for TS, but it is time intensive and there may be parent bias in recalling information for the questions asked (Cohen, et al., 2013).

The *Child Tourette Syndrome Impairment Scale* is a self-report measure with thirty-seven items. This scale provides overall impairment from tics at school, home, and social activities. According to Cohen, et al. (2013), the *Child Tourette Syndrome Impairment Scale* provides more information compared to single-item measures. However, it is most useful when this scale is given in conjunction with a tic severity measure.

Videotape Ratings and Tic Counts is another measure used to assess for TS. Individuals are video recorded for a minimum of 5 minutes. Assessors review the recording and count the number of motor and vocal tics, with a total count of tic frequency. A strength indicated by Cohen et al (2013) is that this measure is an objective measure of tic severity, but it is labor intensive and is vulnerable to sampling bias due to the waxing and waning in tic severity. Weaknesses found with the use of the *Videotape Ratings and Tic Counts* are that it requires a significant amount of equipment and it does not measure the impairment and interference of tics.

School Psychologists' Assessment of Tourette Syndrome

School psychologists' assessment of children with possible TS is extremely important, given that the onset of tics occurs in school-aged children. Singer (2000) suggested that the impact of a child's school functioning should be assessed by a school psychologist by conducting a thorough psycho-educational assessment. Unfortunately, there is limited research in the area of school psychology and the assessment of TS. A common and best practice approach to assessment, however, is to use the R.I.O.T method, which stands for record review, interview, observe, and test.

According to Hagin, "A valid assessment should utilize a variety of achievement measures, such as curriculum-based assessment or individual achievement tests," which include, but are not limited to "Key Math," the "Woodcock Johnson Tests of Achievement," or the "Wechsler Individual Achievement Test" (2003, p. 4). However, assessors should be aware that due to a student's inattention due to tics, the results should be interpreted with caution, as the results may underestimate a student's skills. Therefore, Packer (2005) suggested that school psychologists should assess students with known or suspected TS under untimed conditions in order to determine whether the student has a learning disability.

An assessment to address tic symptoms and/or comorbid behavioral symptoms is a Functional Behavioral Assessment (FBA). An FBA is defined by Gresham, Watson, and Skinner (2001) as a "collection or methods for gathering information about antecedents, behaviors, and consequences in order to determine the reason (*function)* of behavior" (p. 158). School psychologists administer an FBA to gather behavioral data in order to find the function of the student's behavior. Following the gathering and analysis of information, a behavioral intervention is created to improve behaviors.

Treatment

Tourette Syndrome has been treated with pharmacotherapy, psychotherapy, and behavioral interventions. According to Leckman (2002), multimodal treatment for this disorder is appropriate.

Pharmacotherapy. Pharmacotherapy has been the preferred treatment to suppress tics (Carr & Chong, 2005; Vogt & Carroll, 1999), despite medication only reducing 25 to 50% of tics (Roessner et al., 2013) and causing side effects. The most popular drugs used

to treat TS are haloperidol, clonidine, pimozide, and sulpiride (Jimenez-Jimenez & Garcia-Ruiz, 2002; Vogt & Carroll, 1999). According to Scahill, Leckman, Schultz, Katsovich, and Peterson (2003), haloperidol and pimozide are more effective than clonidine. The side effects associated with these drugs are excessive fatigue, memory problems, weight loss, dystonic reactions (e.g., intermittent spasmodic or sustained involuntary contractions of muscles in the face, neck, trunk, pelvis, extremities, and larynx), and cardiovascular changes (Leckman, 2002; Vogt & Carroll, 1999).

The treatment of tics has primarily been with the use of neuroleptic antipsychotics, which are dopamine receptor antagonists that block the action of dopamine (Hartmann & Worbe, 2013). Typical neuroleptics such as haloperidol (Haldol) and pimozide (Orap), which have slightly more favorable side effects than thorazine (another neuroleptic), but may be less effective (Pringsheim & Marras, 2009). Side effects for most neuroleptics are sedation, weight gain, motor problems such as tardive dyskinesia (tic-like reaction) and metabolic disturbance, which include an increase in glucose, lipids, and prolactin. According to Hartmann and Worbe (2013), a concern with the use of neuroleptics is the risk of depression due to anti-serotonergic activity, in addition to diminished dopaminergic transmission. Tetrabenazine and aripiprazole (Abilify) are recently introduced neuroleptics. Side effects for tetrabenazine are sedation but in rare cases it may cause severe depressive reactions. Aripiprazole's side effects are weight gain and sedation (Hartman & Worbe, 2013).

Clonidine (Goetz et al, 1987) and guanfacine (Scahill et al., 2001), both non-neuroleptics, are two medications that are also used in the treatment of tics. Non-neuroleptics are alpha2 receptor agonists, which are another group of drugs used to

alleviate tics (Hartmann & Worbe, 2013; Roessner, 2013). These medications facilitate norepinephrine, a neurotransmitter implicated in physical arousal and anxiety. According to clinical trials, non-neuroleptics are effective but not as effective as neuroleptics (Swain et al., 2007). Other medications such as clonidine and guanfacine are not as frequently used. However, according to Waldon, Hill, Termine, Balottin, and Cavanna (2013), clonidine has been shown to be an effective and safe option for the first-line of tic medication.

Benzodiazepines, in particular clonazepam, also non-neuroleptics, are less frequently used because they are even less effective in the treatment of tics. Benzodiazepines are in the "Valium family" and facilitate GABA, a neurotransmitter that inhibits neural function and typically are used as anti-anxiety agents.

Antipsychotics that include more selective D2 (a subreceptor dopamine site) blocking drugs, such as tiapride and sulpiride (Scahill et al., 2006), are commonly used in Europe (Roessner et al., 2011). According to Roessner et al. (2013), there are several benefits to the use of tiapride as it has shown a reduction of tic symptoms, and it does not appear to influence cognitive performance. Tiapride also does not "influence the neurosecretory, hypothalamic-hypophyseal regulation of sex hormones, thyroid stimulating hormone, growth hormone or thyroid hormone," and have a "favorable benefit-to-risk ratio" (Roessner, et al., 2013, p. 146). Side effects are also limited, being possible weight gain and sedation. Because of the benefits of tiapride, it is the most popular medication used to treat individuals with TS in Europe, but neither tiapride nor sulpiride are currently available in the United States (Eggers, Rothenberger, & Berghaus, 1988; Robertson Schnieden, & Lees, 1990). Antipsychotics with serotonin-blocking

effects, but with variable D2 blocking properties, are medications such as ziprasidone, quetiapine, risperidone, olanzapine, and clozapine; and the partial agonists such as aripiprazole (Scahill, et al., 2006).

Waldon, Hill, Termine, Balottin, and Cavanna (2013) conducted a literature review that focused on randomized, controlled, and double-blind studies comparing pharmacological therapies compared to placebo for the treatment of participants for TS. The literature review included 1,385 participants with TS. According to the review, antipsychotics (haloperidol and pimozide) demonstrated significant reduction in tic severity, with possible side effects including depression, weight gain, sedation, and extrapyramidal side effects (EPSE). The extrapyramidal system is involved in fine motor movement. EPSE are drug-induced movement disorders that include symptoms such as dystonia (continuous spasms and muscle contractions), akathisia (motor restlessness), parkinsonism (characteristic symptoms such as rigidity, bradykinesia and tremor), and tardive dyskinesia (irregular, jerky movements); thus these are not being recommended as the "first line medications" (Bruggeman et al., 2001).

Sallee et al. (1997) conducted a study to examine whether haloperidol or pimozide were more effective in the reduction of tics. According to the results, pimozide was found superior to haloperidol. Risperidone, a newer antipsychotic, is supported to have the best evidence of efficacy by several researchers (Dion, Annable, & Sandor, 2002; Gaffney et al., 2002; Gilbert, Batterson, Sethuraman, & Sallee, 2004; Sallee, Nesbitt, Jackson, Sine, & Sethuraman, 1997; Scahill, Leckman, Schultz, Katsovich, & Peterson, 2003). A study that included school aged participants by Bruggeman, van der Linden, Buitclar, Hawkridge, and Temlett (2001), indicated that risperidone and

pimozide were both effective and safe. However, risperidone was found to be slightly more effective than pimozide.

There are many choices for psychopharmacological therapy for individuals with TS. Due to the range of tic severity, researchers, such as The Tourette Syndrome Association Medical Advisory Board: Practice Committee have advised medical professionals on appropriate treatment protocol (Scahill et al., 2006). Hartmann and Worbe (2013) adapted the advisory board's treatment protocol as follows:

1. There is no treatment requirement for mild tics.
2. Botulinum toxin injections should be considered for isolated tics.
3. For moderate tics, cognitive behavioral therapy (CBT) should be proposed. If medication is the first option, aripiprazole is the drug of choice (2.5-5 mg/day).
4. For severe tics, first increase ariprazole dose, then consider risperidone, pimozide, haloperidol or any other neuroleptic. Next, consider tetrabenazine and anticonvulsants.
5. Finally, in case of pharmaco-resistance, deep brain stimulation can be considered.

Behavioral therapies. Behavior therapies have been used to teach individuals with TS how to change the environmental factors that influence the severity of their tics, and also teach other skills that help optimize their management of their symptoms (McNaught & Mink, 2011). According to Vogt and Carroll (1999), there is evidence for sustained and generalized tic improvement following behavioral or psychosocial interventions, especially with behavioral difficulties not involving tics. Behavioral treatments that have been used to improve TS symptomology include feedback, response

contingencies, token economy, self-monitoring, relaxation, systematic desensitization, operant conditioning, negative or massed practice, reciprocal inhibition, and habit reversal (Vogt & Carroll, 1999).

Cognitive behavioral therapy (CBT). The purpose of *Cognitive Behavioral Therapy (CBT)* is to decrease the targeted behavior by reeducating and relearning behavioral patterns (Leclerc, O'Connor, Forget, & Lavole, 2010). Scahill et al. (2006) indicated that CBT based on exposure and response prevention in combination with medication can be more effective than either CBT or medication alone.

Mindfulness-based stress reduction (MBSR). Tics are automatic reactions to the premonitory urge to tic (Lang, 1991). There has only been one study with people with TS regarding a mindfulness technique to reduce stress, which is to develop nonjudgmental moment-to-moment awareness of self-perception, bodily sensations, thoughts, and emotions. In a recent study by Reese et al. (2015), 16 participants with TS or chronic tic disorder participated in *Mindfulness-based Stress Reduction* (MBSR)-tic. The techniques used were sitting meditation, the body scan, yoga, and walking meditation, in which participants were to gain experience in directing their attention to the moment while refraining from changing their experience. Following the 8-week course, the results indicated reductions in tic severity and tic-related impairment. However, Reese et al. (2015) indicated that the interpretation of the research is preliminary and further studies in this area of research are needed.

Exposure with response prevention (EXRP). According to Capriotti, Himle, and Woods (2014), exposure with response prevention (EXRP) "exposes patients to anxiety-evoking stimuli (exposure) with simultaneously refraining from performing compulsions

to reduce anxiety (response prevention)" (p. 416). EXRP helps an individual with TS refrain from ticcing for a prolonged period of time (e.g., 90 minutes) by exposing them to aversive premonitory urges.

Hoogduin, Verdellen, and Cath (1997) conducted a study with four participants ages 11, 12, 25, and 40 with severe TS symptoms (e.g., head banging). The study was conducted in a clinical setting and the intervention was designed to address tics resulting from TS. The treatment was 10 2-hour sessions of EXRP. The intervention focused on participants' awareness of the premonitory sensations identified with the disorder. In so doing, the participant may be able to prevent the tics and therefore habituate to the sensations. According to the results, compared to the minimum baseline measures, in all four cases there was at least a 50% reduction in tics. More specifically, there was a 100% reduction in the 12-year-old, an 80% reduction in the 25-year-old, a 65% reduction in the 40-year-old, and a 50% reduction in the 11-year-old.

Wetterneck and Woods (2006) conducted a similar study with only one participant with TS. The study was conducted in a clinical setting, two to three times per week, and the intervention was designed to address tics resulting from TS by the use of EXRP. According to the results, the intervention of EXRP was successful, resulting in a reduction of tics.

Verdellen et al. (2008) conducted a study with 19 participants with TS. The study was conducted in a clinical setting and the intervention was designed to address tics resulting from TS by the use of EXRP. The participants were involved in two weekly 2-hour training sessions, which taught them to suppress their tics for as long as possible. Therapists teaching the participants timed the suppression period with a stopwatch until a

tic was produced. Once a tic occurred, the therapist encouraged the patient to improve his or her performance. Participants were also involved in ten weekly 2-hour EXRP treatment sessions in which they were instructed to suppress every tic for 2 consecutive hours (response prevention) and to concentrate on the premonitory experience (exposure). After the participants no longer felt an urge to perform a tic, the procedure was repeated for other emerging sensations and urges. According to the results, EXRP was found to significantly reduce tics, confirming a previous study conducted by Hoogduin et al. (1997), which also found the effectiveness of EXPR in tic reduction.

Habit reversal training (HRT). Habit reversal training (HRT) was a promising treatment first introduced in the early 1970's. HRT is a technique for individuals with TS to become aware of each tic occurrence and engage in a response that directly interrupts the tic (Capriotti, Himle, & Woods, 2014). According to Clark, Bray, Kehle, and Truscott (2001) habit reversal "assumes that tics are a learned response that are marinated by operant reinforcement," (p. 19) which, with the use of competing responses, the tics may no longer occur, or may occur at lower frequencies, by so altering the environment.

There are three primary components in HRT, which include awareness training (AT), competing response training (CRT), and social support. The first component, AT, teaches an individual to "detect and discriminate the occurrence of each tic and/or pre-tic warning (e.g., a premonitory urge)," which is accomplished by the individual with TS informing the therapist or mental health professional each time the target tic is occurring, while the therapist provides feedback to the individual when they miss a tic (Capriotti, Himle, & Woods, 2014, p. 416). This step occurs several times until the individual with TS no longer misses any tics, mastering the first component of HRT. The second

component involves CR, which basically has the individual interrupt their tic by using "any behavior that is (a) physically incompatible with the tic, (b) socially inconspicuous, and (c) easily performed by the patient across a variety of contexts and situations" (Capriotti, Himle, & Woods, 2014, p. 416). According to a study by Gilman et al. (2005), a participant who suffered from hand-to-body tics (e.g., forceful contact with the fist to the ribcage and/or the neck area) was taught to use the specific response of using incompatible behaviors, which included grabbing the underside of a chair and becoming involved in deep breathing exercises. The third component involves social support, which may include a parent, teacher, or other support. These supports are taught to gently prompt the individual with TS when a tic is unnoticed, and to teach them to praise the individual with TS them when they practice the competing response exercise (Capriotti, Himle, & Woods, 2014). Habit Reversal Training is taught over the course of 8 to 11 individual sessions, with each session lasting 60 to 90 minutes (Capriotti, Himle, &Woods, 2014).

Comprehensive behavioral intervention therapy (CBIT). *Comprehension Behavioral Intervention Therapy* (CBIT) is an intervention that helps individuals with TS isolate the factors that make tics worse and change those factors in order to reduce tics and decrease impairment (Woods, 2008). This intervention is considered a function based intervention and is used in conjunction with HRT by a trained individual such as a therapist, school psychologist, or other trained professional. According to Woods (2008), CBIT teaches the child, family, and teacher (a) what makes tics better and worse, (b) how to structure the environment to help the child manage his or her tics, and (c) how the child can react to cues that trigger tics in the environment or cues that come from his or

her own body. Studies have shown that CBIT may be the most effective behavioral therapy for TS, with 50% of patients significantly reducing tic severity (McNaught & Mink, 2011; Woods, Piacentini, & Walkup, 2010). In order for CBIT to be effective, the professionals working with the individual with TS must conduct a function-based assessment to evaluate factors that may be exacerbating the individual's tics. Based on the data collected, modifications are introduced to eliminate or modify factors in order to lessen the exacerbation of an individual's tics. Following the modification of these factors, individuals are taught HRT skills, along with relaxation techniques, which include diaphragmatic breathing (Capriotti et al., 2014).

School Based Interventions

School performance for children with TS can be impacted by tics. Comorbid conditions (e.g., ADHD or OCD), learning disabilities, neuropsychological impairments, medication side effects, and social skill deficits/peer rejection have all been linked to poor school performance for children with TS (Carroll & Robertson, 2000; Kurlan, 1992; Singer, 2000). In the United States, 12% of children with TS are found to be placed in special education classes (Comings, Hines, & Comings, 1990).

Chappell, Leckman, and Riddle (1995) suggested that school interventions should be the first thing considered when children with TS are having academic and behavioral difficulties at school. In order to create appropriate accommodations for students with TS, a function-based clinical interview should be conducted. According to Woods et al. (2008), a list is created identifying the student's various tics and indicating the trigger for the tics or what makes them worse (e.g., specific classes, specific social situations speaking in front of the class, and taking tests) and how they react to those situations

(e.g., anxiety, fatigue, excitement). Students can then be asked what happens immediately after the tics, and how people may react to them (e.g., ask questions, walk away, tease, ask to leave the room).

According to a study conducted by Grace and Russell (2005), students (n=26) were happiest when teachers understood them and respected their feelings and needs. Teachers who talked with their student with TS about his or her tics created more stress, which, in turn, caused tic exacerbation (Woods, Watson, Wolfe, Twohig, & Friman, 2001).

Because teachers are the first individuals who typically set the tone in the classroom, it is important that they are informed about TS and are provided support. Chowdhury and Christie (2002) suggested that training days for teachers may be beneficial in enhancing teachers' knowledge about the syndrome and their individual needs due to several studies indicating that teachers do not have a good understanding of TS.

Aside from possible suggestions of training days for teachers, collaboration between teachers and school psychologists is recommended (Kepley & Conners, 2007). This collaborative model can allow school psychologists to provide support and share possible classroom and/or playground interventions that may be helpful for each individual's needs.

Teachers can provide students with extended time limits, which may be needed because of a variety of TS-related reasons, which Packer (2005) indicated as (a) handwriting difficulties due to visual motor integration impairment, (b) difficulties copying from the board because of visual motor integration impairment, (c) tic-related

interference with handwriting, (d) distraction caused by premonitory urges, (e) reading problems related to the interference of tics, (f) increased tics because of stress related to completion of tasks (timed tasks), and (g) possible medication-related side effects.

Other accommodations that may be helpful to alleviate the aforementioned are to provide the option of alternative ways of producing work, allowing the individual with TS to choose their position in the classroom, and reduced amounts of homework (Packer, 2005, 2007). Other accommodations that teachers can do are to ignore student's tics and/or allow students to walk outside of the classroom (Packer, 2005). According to Bronheim (1991), Conners (2005) and Woods et al. (2008), the following are common accommodations used for children with TS:

- Ignore tics (e.g., not asking the student to stop nor comforting the student).
- Politely point out that tics are occurring and prompt the use of management strategies (verbally or nonverbally).
- Provide a calm and supportive classroom environment.
- Attempt to minimize stressful situations.
- Provide the student with extended time on tests.
- Allow the student to take tests in a different classroom.
- Provide the opportunity to complete work using alternative media (e.g., paper and pencil or computer).
- Allow the student to answer questions in oral rather than written format, or vice-versa.
- Provide the student with copies of notes.
- Provide the student with an audio or video of the class.

- Identify a location where the student can go when his or her tics are particularly distressing.
- Allow the student to initiate a brief break.
- Provide the student with a nonverbal prompt to take a brief break.
- Allow the student to leave the class for an extended break (provided he or she brings along the assigned work).
- Allow the student extended time between classes.
- Provide the student with preferential seating that minimizes attention drawn to tics while allowing active classroom participation.
- Educate the student's teachers about tics.
- Educate the student's peers about tics (with or without identifying the student with tics).

A literature review conducted by Fuchs, Fuchs, Eaton, Hamlett, and Karns (2000), demonstrated that there is not enough research to show the effectiveness of accommodations for students with TS, and that students are normally provided ineffective accommodations. Therefore, it is imperative that each student's needs are studied and appropriate accommodations are implemented. Progress monitoring is necessary to gather data and make appropriate recommendations. If there is a plateau in progress, the accommodation should be revised and/or changed to something that fits the individual's needs. A student's accommodations should also be tailored to help students from feeling isolated or different (Packer, 2005).

School psychologists play a valuable role in the collection of data, developing plans and monitoring for efficiency (Walter & Carter, 1997). However, according to

results of a study conducted by Packer (2005), 9% of respondents (n=71) with TS who received counseling by the school psychologist reported it was helpful, and 13% who received counseling by the school psychologist found it was not helpful. Over 60% of respondents were not offered counseling, 9% of respondents requested counseling but were denied, and 4% were told that counseling services were not available at their child's school. Given the results of the study, Packer indicated a "concern about the extent to which school psychologists are prepared and able to meet the needs of students with tics and TS" (2005, p. 891).

School-based interventions not only include modifications in the classroom, but a school psychologist can provide interventions outside of the classroom. A study conducted by Clark, Bray, and Kehle (2001) attempted to examine the effects of a two-component treatment of HRT, which was previously found to be effective in the clinical setting, and self-modeling. Self-modeling is a method used to positively change one's own behavior through self-observation through videotaping of one in the natural setting. According to the results, there was a significant decrease in the frequency of multiple tics in combination of HRT, HRT monitoring with self-modeling, and the intervention was satisfactory to teachers and students (Clark, Bray, & Kehle, 2001).

Not all children with TS are in need of special education services, but educational interventions may be necessary when (a) a student is falling behind academically, (b) tics are so frequent and forceful that they are impeding a student's learning and their participation in the classroom, (c) the student has significant social issues with others, and (d) the student's self-esteem is in danger (Carter et al., 1999).

School Psychologists' Experiences with Tourette Syndrome

Due to the neurological basis of TS, school psychologists are discouraged from diagnosing the disorder. Medical professionals, such as neurologists, traditionally are those who diagnose. Burd and Kerbeshian (1992) affirmed that school psychologists do not diagnose the majority of children diagnosed with TS. Because school psychologists have more direct daily to weekly contact with children with possible TS, Wodrich (1998) indicated that school psychologists have greater potential to identify and diagnose school children with TS. Increased knowledge of TS "can only enhance the quality of school services to students with TS" (Hagin, 2003, p. 1). According to Rivera-Navarro, Cubo, and Almanzán (2009), physicians reported that educational professionals often confused symptoms of TS with typical adolescent behavior due to poor education or lack of respect.

Wodrich suggested that, "school psychologists must come to recognize conditions of this type and actively promote understanding and treatment of affected school children" (1998, p. 291). Unfortunately, school psychologists may not be educated or have the experience to diagnose or provide interventions for students with this disorder. According to Hagin (2003), there are several facts that may impact students at school which include (a) direct effects of tics on specific tasks (e.g., fine motor skills), (b) tics may interfere with a student's attention as they attempt to suppress their tics in the classroom, (c) there may be physiological effects caused by medication prescribed to relieve tics and/or other symptoms (e.g., drowsiness, slow processing), and (d) social problems (e.g., teasing, rejection from peers, social isolation, or scapegoating).

Therefore, it is necessary to gather baseline data regarding school psychologists' education and experience with TS. These data may help school professionals understand the need in the field for more education and training of recent school psychology graduates and veteran school psychologists alike in order to improve the services provide to students, parents, and school personnel.

There is a lack of research on the education, knowledge, and experience of school psychologists regarding TS. It has been estimated that 20 to 30 percent of school children exhibit brief, repetitive, involuntary movements or sounds in a classroom setting, which are common tic-like behaviors exhibited in childhood (Kurlan, et al., 2001). This is a significant number of students who may need extra support in and outside of school. Children with TS are teased more often, feel a sense of loneliness, and experience negative social interactions (Eysturoy, Skov, & Debes, 2014).

In recent years, two studies were conducted by doctoral students on the East Coast (New York and Philadelphia), regarding school psychologists and their knowledge of TS. Glassman (2010) conducted a survey of 134 school psychologists in the New Jersey and New York areas to determine their knowledge of the diagnostic criteria of TS, its associated characteristics and disorders, and effective interventions. According to the results, graduate training for school psychologists did not have an impact on their levels of knowledge of TS characteristics versus their knowledge of interventions. In addition, Glassman found that respondents were somewhat knowledgeable about the characteristics of TS as well as co-morbid disorders and diagnostic criteria.

Masopust-Macchino (2012) surveyed 287 school psychologists in the State of New York to assess their ability to accurately identify TS when it is presented

concomitantly with ADHD symptoms. The participants also completed the Knowledge of Attention Deficit Hyperactivity Disorder Scales (KADDS). According to the results of this study, neither school psychology programs nor school districts provided the necessary training in the area of TS.

Chapter Summary

Tourette Syndrome is a hyperkinetic neurodevelopmental disorder that is characterized by involuntary motor and/or vocal tics that may be subtle (e.g., eye blinking, throat clearing) or may be more complex tics (e.g., obscene gestures, speaking obscenities). The onset of TS occurs in early school age and may occur with comorbid disorders such as ADHD and/or OCD. Despite different treatments, which include medication and behavior therapies, there is no cure for TS, only the reduction of tic severity. Because the onset of tics occurs when children are of elementary school age, and medication and behavior therapies may not help manage tics, it is important that school personnel become aware of the characteristics of children with TS and their educational needs. Therefore, it is vital that school psychologists are more educated regarding characteristics of TS, and of the children with TS's educational, emotional, and social needs.

Chapter III: Research Methodology

A descriptive survey research design was used to gather information related to the training and knowledge of practicing school psychologists in California. This chapter provides an overview of the study and provides information related to the ethics considered during the study, the procedures used, the web-based survey used to gather data, and participation demographics.

Ethics

This study was conducted following the approval of the Chapman University Institutional Review Board (IRB). The online survey was anonymous and participants were allowed to discontinue the survey at any time.

Procedure

The participants for this study consisted of practicing school psychologists in California. The California Association of School Psychologists (CASP) was contacted via website where an online request form was completed in order to gain approval for advertisement of the web-based survey link entitled *School Psychologists' Training and Knowledge of Tourette Syndrome* on the CASP website, as well providing the link to the survey on their monthly email blasts to CASP members. The link on both the CASP website and that of the email blast was a web-based survey link, LimeSurvey (http://acadtech.chapman.edu/limesurvey/index.php?sid=54526&lang=en). CASP was paid $75 per month for two months (April and May 2015), consecutively, for the advertisement of the survey on their website, and a mention on an email blast to all current CASP members. According to a CASP representative, there were 1,607 CASP members at the time of this study.

A similar approach was taken in regards to contacting program directors of school psychology programs at various California university campuses. An internet search for school psychology programs in California was conducted on the search engine Google. Following the search, a within college/university search was conducted for the education or psychology department, depending on where the school psychology program was housed. Once that was established, email information for the directors of the school psychology program was gathered. All directors were blind copied in the same email inviting them to complete the survey, asking if they were practicing school psychologists, and asking to forward the request for completion of the web-based survey to current practicing school psychology students (e.g., doctoral students) in their program and/or alumni. Participants were also sought out by personal conversation with colleagues and/or by sending an email invitation with the web-based survey link to colleagues, as well as asking colleagues to forward the link to other practicing school psychologists.

Additionally, those contacted were asked to forward the email to other colleagues. The researcher attempted other means of gathering participants by researching CASP affiliates throughout California on their website. Information regarding affiliates and their presidents' contact information was available to the researcher. Thus, presidents were contacted via email and were provided a direct link to the web-based survey, and asked to participate in the survey and to forward the request to their members. A second email was sent as a follow up reminder. Despite all efforts, only 103 practicing school psychologists participated in the survey, with 97 participants responding completely to the survey. Six participants did not complete the survey (these cases were not included in the final results).

Instrument

The web-based survey, *School Psychologists' Training and Knowledge of Tourette Syndrome*, was constructed for the purpose of studying practicing school psychologists' knowledge of TS and where they received their training and/or knowledge. A web-based survey was used in order to gather information in a more convenient way for both the researcher and the participant. The use of LimeSurvey to gather participant responses was cost-effective as it was a free service provided by Chapman University, and postage was not needed because of the easy distribution of the survey via email. The web-based survey allowed the researcher the ease to gather data, as well as compute descriptive statistics via the survey site.

Although there are positive aspects to the use of a web-based survey, there are also limitations. Even a survey designed for convenience may prove overwhelming due to the large numbers of emails potential participants receive in their daily work/lives. Also, the priority of those emails compared to that of the survey, and/or disinterest in the topic presented, may result in overlooking the survey. Couper (2000) indicated that participants may "tune out" the survey or base their interest and/or responses by the visual effect and entertainment value of the instrument. Additionally, research shows that web surveys often fail to meet the response rates of traditional mail surveys (Couper, 2000).

The web-based questionnaire was created and pilot tested with the help of two school psychology interns before its use in this study. Items on the survey were rationally derived to answer the research questions about school psychology training and knowledge about TS. Knowledge items were derived from the DSM-5 and the literature

on TS. These questions were proposed before conducting this study in order to help guide the researcher. Prior to conducting the survey, a professor of school psychology was consulted regarding the clarity and relevance of the survey questions to this study. Input was considered and revisions were made regarding clarity of the wording of the items and response formats and coverage of the research questions. The pilot testing indicated that the survey would take 5 to 10 minutes to complete depending on the level of knowledge, training, and experience of the participant.

Final Survey

The final survey entitled, *School Psychologists' Knowledge and Training of Tourette Syndrome,* included a total of 44 items, of which 17 were multiple choice, 14 were yes/no, 10 were fill in/open ended, and 6 items were true/false (see Appendix B for the complete survey). Questions on the first portion of the survey were demographics about the individual participant, such as gender, ethnicity, and age, followed by items related to respondents' education, highest degree earned, and university/college attended. Information regarding the school psychologist's employment (e.g., years of employment, region of employment, district size) was also gathered. Following basic personal information about the participant, a short quiz consisting of five questions about TS was conducted to gather an understanding of the participant's basic knowledge of TS. After the short quiz on TS, 9 items were asked about training of TS, 4 questions were asked about the participant's knowledge regarding TS, and 13 items were asked concerning the participant's experience with TS. A final open-ended question was provided for any question, comments, and/or concerns the participant may have had for the researcher.

Participants

A total sample of 97 practicing school psychologists in the state of California completed the survey in its entirety. Descriptive data, as provided by participants' responses on the general demographic survey, provided information about the sample (see Table 1). Of the 97 participants, 73.2% (n = 71) identified as female, and 26.8% (n=26) identified as male. The participants' ages ranged from 24 to 70 years of age with a mean age of 40.9 (*SD* = 10.2). More specifically, age ranges were 24 to 30 years old, which was 17.5% of the sample (n=17), ages 31-35, which was 13.4% (n=13), ages 36-40, which was 25.8% of (n=25) the sample, ages 41-45, which was 15.5% (n=15) of the sample, ages 46-50, which was 11.3% (n=11) of the sample, ages 51-55 which was 8.2% (n=8) of the sample, ages 56-60 which was 3.1% (n=3) of the sample, 61-65 which was 4.1% of the sample (n=4), and ages 66-70, which was 1% of the sample (n=1). The majority of participants, 60.8% (n=59) were White/European American, 21.7% (n=21) were Hispanic/Latino American, 7.2% were Asian American, 6.2% (n=6) were Black/African American, and Pacific Islander and Other comprised 2% (n=2) of the sample.

Other information compiled indicated that the majority of participants who had earned a Master's degree, which was 54.6% (n=53) of the sample. Participants who had an Educational Specialist degree comprised 30.9% (n=30) of the sample, and 14.4% (n=14) had a Doctorate degree. The majority of participants, 48.5% (n=47), earned their degree at a private California university, 37.1% (n=36) earned their degree at a California State University, 13.4% (n=13) earned their degree at an out of state institution, and 1% (n=1) earned their degree at a University of California campus. Participants who

graduated between the years 2000 and 2009 comprised 47.4% (n=46) of the sample, graduates between 2010 and 2015 comprised 28.9% (n=28) of the sample, those who graduated in the 1990's comprised 20.6% (n=20) of the sample, graduates in the 1980's comprised 2.1% (n=2), and 1% (n=1) of the sample graduated in 1979.

According the data, 79.4% (n=77) of participants were employed in Southern California, 16.5% (n=16) were employed in Northern California, and 4.1% (n=4) were employed in Central California. Most school psychologists work across grade levels (e.g., elementary and middle, middle and high school, or preschool and high school), as indicated by percentages in differing grade levels totaling over 100%. According to this information, the majority of participants in this study worked at the elementary school level, comprising 69.1% of the sample size, 62.9% worked in a high school, 56.7% worked at a middle school, and 27.8% worked at the preschool level. The majority of participants (38.1%) had been employed 11 to 15 years as school psychologists (n=37). Participants with 6 to 10 years experience comprised 21.6% (n=20) of the sample. Participants employed 1 to 5 years as school psychologists comprised 22.7% (n=22) of the sample size, and school psychologists who worked in the field over 21 years comprised 10.3% (n=10) of the sample.

Of the 97 participants, 11.3% worked in districts with less than 5,000 students, 37.1% worked in districts with 5,001 to 50,000 students, 32% of participants worked in districts with between 50,001 to 100,000 students, 7.2% of participants worked in districts with 100,001 to 500,000 students, 8.3% worked in districts with 500,001 to 700,000 students, and 4.1% worked in districts with over 700,001 students. Most participants, 56.7%, reported working in an urban setting, 37.1% reported working in a

suburban setting, and 6.1% of participants indicated they worked in a rural setting. Participants worked with families of various socioeconomic levels. According to the data, 4.1% of participants worked with upper socioeconomic status (SES) students, 19.6% of participants worked with upper middle SES students, 23.7% worked with middle SES, and 52.6% of participants worked with lower SES students.

Table 1

Sample Characteristics

Characteristic	*n*	%
Gender		
Female	71	73.2
Male	26	26.8
Age		
24-30	17	17.5
31-35	13	13.4
36-40	25	25.8
41-45	15	15.5
46-50	11	11.3
51-55	8	8.2
56-60	3	3.1
61-65	4	4.1
66-70	1	1.0
Race/Ethnicity		
White/European American	59	60.8
Black/African American	6	6.2
Hispanic/Latino American	21	21.7
Asian American	7	7.2
Pacific Islander	2	2.0
Native American	0	0
Other	2	2.0
Educational Level		
Masters Degree	53	54.6
Education Specialist	30	30.9
Doctorate	14	14.4
Educational Institution		
California States University	36	37.1
University of California	1	1.0
Private California University	47	48.5
Out of State Institution	13	13.4
Graduate Year		
1979	1	1.0
1980’s	2	2.1
1990’s	20	20.6
2000-2009	46	47.4
2010-2015	28	28.9
Employment in California Region		
Northern	16	16.5
Central	4	4.1
Southern	77	79.4

Characteristic	*n*	%
Years Employed as a School Psychologist		
1-5	22	22.7
6-10	20	21.6
11-15	37	38.1
16-20	8	8.2
21 or more	10	10.3
Size of District Currently Employed		
Less than 5,000 students	11	11.3
5,001-50,000 students	36	37.1
50,001-100,000 students	31	32.0
100,001-500,000 students	7	7.2
500,001-700,000 students	8	8.3
Over 700,001 students	4	4.1
Grade Levels		
Preschool	27	27.8
Elementary	67	69.1
Middle School	55	56.7
High School	61	62.9
Type of Work Setting		
Rural	6	6.1
Urban	55	56.7
Suburban	36	37.1
Socioeconomic Level of Families in School District		
Upper SES	4	4.1
Upper Middle SES	19	19.6
Middle SES	23	23.7
Lower SES	51	52.6

Chapter Summary

This chapter includes the procedures used to solicit participation in this study, the web-based survey used to gather data, and the participant demographics. The results of the survey, which are descriptive and correlational data, are presented in the next chapter.

Chapter IV: Results

This chapter summarizes the data compiled from surveys completed by school psychologists in Northern, Central, and Southern California regarding their training, knowledge, and practices when working with students with Tourette Syndrome (TS). Descriptive statistics are detailed for each question. Correlations were conducted on the number of TS cases with which a school psychologist (SP) had worked and the number of years they had practiced, and on their confidence level regarding working with children with TS.

Data Analysis

An analysis was conducted after questionnaire data were compiled, scored, and organized, using descriptive statistics. A correlation was conducted between SP knowledge of TS and their years since graduation, to address possible relationships between training and knowledge of TS following graduation from their program. For example, if a student recently graduated, they may have been provided more information in their training program about TS compared to that of someone who graduated in the early 1980s when SP programs were not as rigorous (current programs require a three-year Education Specialist degree as compared to a two year Master's degree).

Following the 12 questions on demographic information, the questionnaire contained a short quiz comprised of 5 questions related to characteristics of TS (Table 2). The first question on the quiz asked whether TS typically appears at birth. According to the data, 85% of the 97 respondents answered correctly (false), and 15% (n=15) answered incorrectly. Of the 97 respondents, 94% (n=91) responded correctly to the second question (true), which was whether a common tic found in children with TS is rapid eye

blinking, and 6% (n=6) answered incorrectly. A high number of respondents answered the third question correctly, which is whether girls are at a higher risk of TS than boys (false), with 92% responding correctly, and 8% answering incorrectly. The fourth question, which asked whether children with TS are more likely to develop Obsessive Compulsive Disorder (OCD), was answered correctly by 84% (n=81) of respondents (true), and 16% (n=16) answered incorrectly. The final question asked whether extreme and frequent tics result in sleep disturbances. According to the responses, 80% (n=78) of respondents answered correctly (true), and 20% (n=19) answered incorrectly.

Table 2: Knowledge of Tourette Syndrome		
13. Tourette Syndrome typically appears at birth		
	N	**Percentage**
True	15	15.5%
False*	82	84.5%
14. A common tic found in children with Tourette Syndrome is rapid eye blinking.		
True*	91	93.8%
False	6	6.2%
15. Girls are at higher risk for Tourette Syndrome.		
True	8	8.3%
False*	89	91.8%
16. Children with Tourette Syndrome are more likely to develop Obsessive Compulsive Disorder (OCD).		
True*	81	83.5%
False	16	16.5%
17. Extremely frequent and intense tics result in sleep disturbance.		
True*	78	80.4%
False	19	19.6%

Note: * indicates the correct response

The second section of the questionnaire, which was regarding SP experience and training in TS, included a mixture of 9 open-ended, true/false, and multiple-choice questions. The first question asked respondents how many cases of children with TS with which they had been involved throughout their career as a school psychologist (see Table 3). According to the data, of the 97 of the respondents, 27.8% (n=27) indicated that they had not had a case involving TS, 19.6% (n=19) of respondents indicated working with 1 case, 18.6% (n=18) indicated they were involved with 2 cases, 14.4% (n=14) of respondents had 3 cases with TS, and 8.2% (n=8) of respondents indicated working with 5 cases. Four percent (n=4) of the respondents indicated being involved in 10 cases, 3% (n=3) indicated being involved in 4 cases, 2% (n=2) indicated being involved in 20 cases, 1% (n=1) indicated being involved in 8 cases, and another 1% (n=1) indicated working with 15 cases. Overall, the sum of cases reported by all 97 respondents was 252, with mean of 2.6 cases per respondent and a standard deviation of 3.66.

Table 3: Experience with Tourette Syndrome		
18. How many cases of Tourette Syndrome (TS) have you been involved in throughout your career as a school psychologist?		
Number of Cases	**N**	**Percentage**
0	27	27.8%
1	19	19.6%
2	18	18.6%
3	14	14.4%
4	3	3.1%
5	8	8.2%
8	1	1.0%
10	4	4.1%
15	1	1.0%
20	2	2.1%
Total Cases	252	
Standard Deviation	3.66	
Mean	2.6	

The next set of questions regarding training in TS asked respondents how many courses they had taken in their SP programs that touched upon TS (see Table 4). According to the data, 37% (n=36) of respondents indicated that they had taken at least 1 course that touched upon TS, 23% (n=22) of respondents indicated that they had taken at least 2 courses that addressed TS, 3% (n=3) of respondents indicated that they had taken at least 3 courses, 1% (n=1) of respondent indicated that they had taken at least 4 courses, and another 1% (n=1) of respondents indicated that they had taken at least 10 courses that touched upon TS. However, 36% (n=35) of the 97 respondents indicated that they had

not taken any course that touched upon TS. Thus, the overall number of courses taken among the 97 respondents totaled 101 courses, with a mean of 1.04 courses and a standard deviation of 1.28.

Despite the majority of individual respondents indicating that they had taken courses touching upon TS, 12% (n=12) of the 97 respondents indicated having been trained in the assessment of TS, and the majority of 88% (n=85) indicated that they had not been trained in the assessment of TS, according to responses on the third question. The next question asked respondents how many hours of training they had received in TS. According to the responses, 88% (n=85) of the 97 respondents indicated that they did not receive any hours of training in the assessment of TS, 4% (n=4) indicated that they received 1 hour of training, 4% (n=4) indicated that they had received 2 hours of training, and the remaining 4% (n=4) indicated receiving 3 or more hours of training. Of those respondents who indicated being trained in the assessment of TS, 21% (n=20) of respondents indicated that they were advised on what assessment tools to use, and 79% (n=77) of respondents did not answer the question, indicating that they did not receive training in the assessment of TS.

Twenty-one percent of the participants responded to the question related to specific assessment tools with which they were familiar. However, some of the responses were not relevant to the question. For example, one respondent indicated that the "same tools for other kids" should be used, but with the addition of accommodations. Other responses were very basic in nature, with the typical assessment procedures used for most assessments such as record review (4), interview (5), observation (8), IQ testing (1), assessment (1), consultation with physician (1), behavioral assessment using ABA

sequence (1), and self-report (1). Other general responses included social emotional scales (2), behavior rating scales (1), DSM 4 (1), medical records (2), behavior charting (1), anxiety measure (1), OCD measure (1), and "others to rule out" (1). More specific measures were indicated such as the Basic Achievement Skills Inventory (BASI) (1), Millon Adolescent Clinic Inventory (MACI) (1), Cognitive Performance Test (CPT) (1), Stroop Effect Test (1), Children's Color Trials Test (CCTT) (1), Conners (1), Behavior Assessment System for Children (BASC) (1), Achenbach (1), and Social Skills Rating System (SSRS) (1). Four of the responses indicated "not applicable," and one of the respondents indicated that they were trained in behavioral courses but did not indicate the actual assessment tools advised.

Respondents also were asked if they were trained to counsel students with TS while in their SP program. According to responses, 14% (n=14) of SP were trained in counseling students with TS, and 86% (n=83) were not. Of those respondents who were trained, 6% (n=6) were trained for 1 hour, 4% (n=4) were trained for 2 hours, and 5% (n=5) of respondents were trained for 3 or more hours.

The majority of respondents (90%, n=87) indicated that they did not receive adequate training in the assessment of students with TS, and 10% indicated that they did receive adequate training. Of the 90% (n=87) of the participants who responded they did not receive adequate training, 70% indicated that they were not confident in assessing students with TS, and 30% of respondents were confident in assessing students with TS.

Table 4: Training in Tourette Syndrome

19. How many courses did you take in your school psychology program that touched upon TS?

Number of Courses	N	Percentage
0	35	36.1%
1	36	37.1%
2	22	22.7%
3	3	3.1%
4	1	1.0%
10	1	1.0%
Total Courses	101	
Standard Deviation	1.28	
Mean	1.04	

20. Were you trained in the assessment of TS in your school psychology program?

Answer	Number
Yes	12
No	85

21. How many hours of training were involved?

Answer	N	Percentage
None	85	87.6%
1	4	4.1%
2	4	4.1%
3 or more	4	4.1%

22. If you were trained, what assessment tools were advised to use?

	N	Percentage
Answered	20	20.6%
No Answer	77	79.4%

Answers: Assessment Tools	N
Accommodations	1
Achenbach	1
Anxiety Measure	1
Assessment	1
Cognitive Performance Test (CPT)	1
Basic Achievement Skills Inventory (BASI)	1
Behavior Assessment (ABA Sequence)	1
Behavior Assessment System for Children (BASC)	2
Consultation with Physician	1
Behavior Charting	1
Behavior Courses	1
Behavior Rating Scale	1
Children's Color Trials Test (CCTT)	1
Conners	1
The Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-4)	1
Intelligence Quotient (IQ)	1
Interview	5
Million Adolescent Clinic Inventory (MACI)	1
Medical Records	2
Not Applicable	5
Observation	8
OCD Measure	1
Record Review	4
Rule out similar disorders	1

Social Emotional Scales	2
Social Skills Rating System (SSRS)	1
Stroop Effect Test	1
Student Self-Report	1

23. Were you trained in counseling students with TS in your school psychology program?		
Answer	**N**	**Percentage**
Yes	14	14.4%
No	83	85.6%

24. How many hours were you trained?		
Answer	**N**	**Percentage**
None	82	84.5%
1	6	6.2%
2	4	4.1%
3 or more	5	5.2%

25. Do you feel hat the training you received in your school psychology program was adequate in the assessment of TS?		
Answer	**N**	**Percentage**
Yes	10	10.3%
No	87	89.7%

26. Are you confident assessing a student with TS?		
Answer	**N**	**Percentage**
Yes	29	29.9%
No	68	70.1%

The third section of the questionnaire was related to school psychologists' knowledge of TS, which included 17 questions (see Table 5). When the 97 respondents were asked how they would rate their level of knowledge regarding the often present

social skills deficits in TS, the majority, 53% (n=51), rated themselves as being "somewhat" knowledge, 37% (n=36) indicated having "very little" knowledge, 6% (n=6) indicated having no knowledgeable, and 4% (n=4) indicated that they were "very" knowledgeable. When respondents were asked about their knowledge of the presence of executive functioning deficits in TS, the majority, 48%, (n=47) indicated having "very little" knowledge, 24% (n=23) indicated being "somewhat" and "not at all" knowledgeable, and 4% (n=4) indicated being "very" knowledgeable. The majority of respondents, 46% (n=45), indicated having "very little" knowledge regarding their level of knowledge about the academic deficits associated with TS, 39% (n=38) indicated being "somewhat" knowledgeable, and 13% (n=13) indicated not being knowledgeable at all. Of the 97 respondents, 1% (n=1) indicated being "very" knowledgeable of the academic deficits associated with TS.

If respondents thought they were "somewhat" or "very" knowledgeable about TS, they were asked to check all possibilities of where they primarily learned about the disorder. The majority of respondents (39%, n=38) indicated that they had learned about the disorder at workshops/seminars, 38% (n=37) indicated that they had learned about the disorder on internet websites, 35% (n=34) of respondents indicated learning about the disorder independently, and 31% (n=30) indicated learning about the disorder from parents of children with TS. According to the data, 19% (n=18) of respondents learned about TS through colleagues, 18% (n=18) learned about the disorder in their university or college training program, and 16% (n=16) learned about the disorder through "other" means.

Table 5: Tourette Syndrome Knowledge		
27. How would you rate your level of knowledge about the social deficits often present in TS?		
Answer	**N**	**Percentage**
Not at All	6	6.2%
Very Little	36	37.1%
Somewhat	51	52.6%
Very	4	4.1%
28. How would you rate your level of knowledge about the executive function deficits often present in TS?		
Answer	**N**	**Percentage**
Not at All	23	23.7%
Very Little	47	48.5%
Somewhat	23	23.7%
Very	4	4.1%
29. How would you rate your level of knowledge about the academic deficits often present in TS?		
Answer	**N**	**Percentage**
Not at All	13	13.4%
Very Little	45	46.4%
Somewhat	38	39.2%
Very	1	1.0%
30. If you feel at least somewhat knowledgeable about TS, from what source did you primarily learn about the disorder?		
Answer	**N**	**Percentage**
University or College Training Program	17	17.5%
Workshops/Seminars	38	38.2%

Independent Study	34	35.1%
Parents of Children with TS	30	30.9%
Colleagues	18	18.6%
Internet Websites	37	38.1%
Other	16	16.5%

Of the 97 practicing school psychologists who were involved in the study, 30% (n=29) indicated that they had not worked with any children diagnosed with TS (see Table 6). However, 19% (n=18) of respondents indicated working with 1 case of a child diagnosed with TS either through evaluation, case management, consultation, or in a different manner, another 19% (n=18) of respondents worked with 2 children who were diagnosed with TS, 12% (n=12) of respondents indicated that they had worked with 3 children who were diagnosed, 8% (n=8) of respondents indicated working with 5 cases of TS, 4% (n=4) indicated working with 10 cases of children with diagnosed TS, 3% (n=3) indicated working with 15 children diagnosed with TS, and 2% (n=2) of respondents indicated working with 4 cases of children diagnosed with TS. One respondent indicated working with 20 cases of children with diagnosed TS. Therefore, the total number of cases of children diagnosed with TS with whom the respondents worked was 257, with a mean of 2.65 and a standard deviation of 3.69.

There were fewer cases of students without diagnosis with whom respondents had worked, including evaluation, case management, and consultation. According to the data, 46% (n=45) of respondents did not work with any students who were not diagnosis with TS. However, 21% (n=20) of respondents indicated that they had worked with a student without a TS diagnosis, 10% (n=10) indicated that they had worked with 2 students

without a diagnosis of TS, 9% (n=9) indicated working with 3 students without a diagnosis of TS, 4% (n=4) indicated working with 5 students without a diagnosis, and 2% (n=2) indicating working with 6, 10, and 15 cases without a diagnosis of TS.

There were no referrals received by 63% (n=61) of participants for assessment of children with TS. However, according to 12% (n=12), 2 students with TS were referred to them for assessment, 11% (n=11) indicated having been referred 1 student for assessment, 4% (n=4) indicated having had 3 children referred for assessment, 3% (n=3) indicated having had 5 children referred, 3% (n=3) indicated having 10 children with TS referred, and 1% (n=1) indicated having 23 children with TS referred for an assessment. Overall, there were 131 total referrals for assessment, with a mean of 1.35 referrals made, and a standard deviation of 3.13. Further, the majority of school psychologists in this study (57%, n=55) indicated that they had worked with students who had both motor and vocal tics, 23% (n=22) worked with students who only had motor tics, and 8% (n=8) worked with students who only had vocal tics.

Respondents were asked whether they had referred the student(s) without a diagnosis of TS to a medical doctor and/or neurologist. According to the data, 59% (n=57), which was the majority of school psychologists participating in this study, did not respond to the question. Of the 97 respondents, 31% (n=30) answered that they had referred an undiagnosed student(s), and 10% (n=10) indicated that they had not referred the student(s). Of those who had made a referral, their responses were as follows: mental health, therapist, clinical psychologists, psychiatrist, medical doctor, counseling, Stramski Center in Long Beach, CA, parents were informed, and Yale University's Tourette's Clinic.

The participants were asked whether they had provided counseling services to students with TS. The responses indicated that 76% (n=74) had not been involved in providing counseling services to students with TS, and 24% (n=23) had been involved in providing counseling. According to the 24% who had provided counseling for students with TS, the following interventions were used: relaxation techniques, yoga breathing, ABA, Cognitive Behavioral Therapy (CBT), Coping Cat (CBT for anxiety), Comprehensive Behavioral Intervention for Tics (CBIT), Skills Streaming, systematic desensitization, social enrichment activities, and Child Centered Play Therapy. One of the respondents who did not provide therapy indicated that they provided a teacher with a DVD entitled *Teaching Children with Tourette Syndrome* by the Tourette Syndrome Association. When asked what specific techniques were used, 13% (n=13) of respondents indicated that they used Solution Focused Therapy, 12% (n=12) used CBT, 9% (n=9) used talk therapy, 6% (n=6) used "other" techniques, and 2% (n=2) used a TS counseling curriculum.

Respondents were asked if they had attempted research-based interventions. According to responses, 9% (n=9) of the 97 participants indicated that they had attempted research-based interventions, 29% (n=28) had not, and 62% (n=60) did not provide an answer. Of those who had attempted research-based interventions, 5% (n=5) had attempted CBIT, 2% (n=2) had attempted Habit Reversal Therapy, and 3% (n=3) had attempted "other" research-based interventions.

Reportedly, 47% (n=46) of respondents indicated that the students with whom they had worked had social issues with their peers, 9% (n=9) indicated that they did not, and 43% (n=42) of participants did not answer the question. When asked if classroom

and/or school wide education about TS was provided, 44% (n=43) of participants did not respond, 38% (n=37) of participants indicated that they had not provided classroom and/or school wide education, and 18% (n=17) responded that they had.

Table 6: Tourette Syndrome Experience

31. How many children diagnosed with Tourette Syndrome have you worked with in your capacity as a school psychologist (either through evaluation, case management, consultation, etc.)?

Number of Cases	N	Percentage
0	29	29.9%
1	18	18.6%
2	18	18.6%
3	12	12.4%
4	2	2.1%
5	8	8.3%
6	1	1.0%
8	1	1.0%
10	4	4.1%
15	3	3.1%
20	1	1.0%
Diagnosed Cases	257	
Standard Deviation	3.69	
Mean	2.65	

32. How many children with suspected Tourette Syndrome, who were not diagnosed, have you worked with in a capacity as a school psychologist (either through evaluation, case management, consultation, etc.)?

Number of Cases	N	Percentage
0	45	46.4%
1	20	20.6%

2	10	10.3%
3	9	9.3%
4	3	3.1%
5	4	4.1%
6	2	2.1%
10	2	2.1%
15	2	2.1%
Non-Diagnosed Cases	161	
Standard Deviation	2.77	
Mean	1.66	

33. How many referrals have you received, since being a school psychologist, which were for assessment of a child with Tourette Syndrome?

Number of Referrals	**N**	**Percentage**
0	61	62.9%
1	11	11.3%
2	12	12.4%
3	4	4.1%
5	3	3.1%
8	2	2.1%
10	3	3.1%
23	1	1.0%
Referrals Received	131	
Standard Deviation	3.13	
Mean	1.35	

34. If you have worked with student(s) with Tourette Syndrome, what types of tics did the student(s) present?

Answer	**N**	**Percentage**
Vocal	8	8.3%
Motor	22	22.7%

Motor and Vocal	55	57%
35. If a student was not diagnosed with Tourette Syndrome, did you make a referral to a medical doctor and/or a neurologist?		
Answer	**N**	**Percentage**
Yes	30	31%
No	10	10.3%
No Answer	57	58.8%
36. If a referral was made but not to a medical doctor and/or neurologist, to whom was this student referred?		
	N	**Percentage**
Answer	12	12.4%
Referrals were made to:	Mental health, medical doctor, parent was informed, Stramski Center clinical psychologist, therapist, psychiatrist, and Yale's University Tourette's Clinic.	
No Answer	85	87.6%
37. Have you been involved in providing counseling services to a student(s) with Tourette Syndrome?		
Answer	**N**	**Percentage**
Yes	23	23.7%
No	74	76.3%
38. If you used Tourette Syndrome counseling curriculum, please list the curriculum you've used.		
	N	**Percentage**
Answer	12	12.4%
Referrals were made to:	Teacher Resource give to teacher: a DVD entitled *Teaching Children with Tourette Syndrome* by the Tourette Syndrome Association, relaxation techniques, yoga breathing, ABA, Cognitive	

	Behavioral Therapy (CBT), Coping Cat (CBT for anxiety), Comprehensive Behavioral Intervention for Tics (CBIT), Skills Streaming, systematic desensitization, social enrichment activities, Child Centered Play Therapy.	
No Answer	85	87.6%
39. If so, what techniques did you use during counseling sessions?		
Answer	**N**	**Percentage**
Talk Therapy	9	9.3%
Solution Focused Therapy	13	13.4%
Cognitive Behavior Therapy (CBT)	12	12.4%
Tourette Syndrome Counseling Curriculum	2	2.1%
Other	6	6.2%
40. Have you attempted research-based interventions?		
Answer	**N**	**Percentage**
Yes	9	9.3%
No	28	28.9%
No Answer	60	61.9%
41. If so, which research-based interventions have you attempted?		
Answer	**N**	**Percentage**
Habit Reversal Therapy	2	2.1%
Comprehensive Behavioral Intervention for Tics (CBIT)	5	5.2%

Other	3	3.1%
42. Did most of the student(s) have social issues with peers?		
Answer	**N**	**Percentage**
Yes	46	47.4%
No	9	9.3%
No answer	42	43.3%
43. Did you provide classroom and/or school wide education about Tourette Syndrome?		
Answer	**N**	**Percentage**
Yes	17	17.5%
No	37	38.15%
No Answer	43	44.3%

A Pearson product-moment correlation coefficient was computed to assess the relationship between years of experience as a school psychologist and the number of cases involving students with TS. According to the data, there was a moderate correlation between the two variables [$r = 0.456$, $p = .000$] that was statistically significant. Not surprisingly, this result indicates that the more experience a school psychologist had, the more likely they were to have worked with students with TS.

Another Pearson product-moment correlation coefficient was computed to assess the relationship between years of experience as a school psychologist and their confidence assessing students with TS. According to the data, there was a small, negligible negative correlation between the two variables [$r = -.082$, $p = .426$]. This result indicates that there was no relationship between school psychologists' confidence in assessment of TS and their years of experience as school psychologists.

Respondents' Comments

Twelve of the 97 participants provided comments at the end of the survey. Four participants wished the researcher luck on the data collection and dissertation. One comment indicated that the topic was "very interesting [and] would like to learn more about the syndrome" and another comment thanked the researcher for helping them "reflect in this area!" One of the participants indicated that they had two master's degrees in psychology and that most of their knowledge was obtained from classes that focused on various disorders "not Tourette's in particular." A school psychologist who completed the study indicated that they worked at a Catholic TK-8 school, which is a part of a Diocese and not a district, indicating that the researcher had forgotten to include private schools in the demographics section of the survey. The other comments indicated that participants had not had much experience with students with TS and were interested in learning more about the disorder.

Chapter Summary

Overall, an average of 88.8% of the 97 participants of this survey correctly answered all five questions on the short TS quiz. Respondents indicated that they were involved in an average of 2.6 cases of TS throughout their career. The majority of participants indicated that they did not receive training in the assessment of TS or were trained in the counseling of students with TS. Thus, 90% (n=87) of participants' responses indicated that they were not provided adequate training in the assessment of TS, and 70% did not feel confident in assessing students with TS. The majority of participants indicated that they were "somewhat" knowledgeable about the social deficits associated with TS, but the majority of participants responded they knew "very little"

about both executive function and academic deficits associated with TS. There was a moderate correlation that was statistically significant between the numbers of cases of students with TS with whom a school psychologist had worked in relation to their years of experience. There was no relationship between experience and confidence in the assessment of TS. The results are discussed in the next chapter.

Chapter V: Discussion

The purpose of this study was to examine school psychologist's (SP) training and knowledge of Tourette Syndrome, specifically those practicing in the state of California. This chapter provides an interpretation of the findings, a summary of the findings, strengths and limitations of the study, and a discussion of the implications of the study for the practice of school psychology and suggestions for future research. The discussion of the major findings is organized according to the main research questions of the study.

Interpretation of the Findings

Research Question One: How much training on Tourette Syndrome do school psychologists receive in their training programs?

According to results from respondents, most participants indicated that they had either taken two courses that touched upon TS in their school psychology program, they had taken one course, or they had not taken a course. The majority of responses, according to results, indicate that they were not trained in the assessment of children with TS. Overall, the participants' responses indicated that they did not feel that they had received adequate training in TS and were not confident in assessing and counseling students with TS.

Research Question Two: How knowledgeable are school psychologists regarding Tourette Syndrome?

The results from the short quiz on TS indicated that the majority of respondents were aware of basic TS characteristics. Information related to school psychologists and

their work with students with TS indicated that a majority of respondents were not knowledgeable regarding assessment of students with TS and possible rating scales specifically designed for the assessment of persons with TS. According to responses, the majority of school psychologists were not aware of research-based interventions, including counseling techniques. Respondents were aware of their lack of knowledge in assessment, counseling, and research-based interventions.

Research Question Three: What assessment methods do school psychologists utilize with students with Tourette Syndrome?

Of the 97 participants, 21% answered the question related to assessment tools. For those who answered the question regarding assessment tools, there did not appear to be a "universal" protocol for the assessment of children with TS. According to these responses, it is clear that school psychologists are not trained adequately in the assessment of children with TS and lack the knowledge regarding specific tools used in the assessment process of TS.

Research Question Four: What interventions, if any, for Tourette Syndrome do school psychologists utilize in the school setting?

Sixty-one percent of participants did not answer the question related to attempting to provide research-based interventions for students with TS, 28% indicated that they had not attempted research-based interventions, and 9% of respondents indicated that they had attempted research-based interventions. Of the 9% of respondents who indicated providing research-based interventions, 2% of participants indicated using HRT (n=2), 5% of participants indicated using CBIT (n=5), and 3% of participants indicated using "Other" (n=3). Twenty-four percent (n=23) of the 97 participants in this study indicated

that they had provided counseling services for students with TS. Of the 24%, 12% (n=12) answered questions relating to techniques and/or curriculum used in counseling. According to the results, counseling techniques used were Talk Therapy (n=9), Solution Focused Therapy (n=13), Cognitive Behavior Therapy (n=12), Tourette Syndrome curriculum (n=2), and "Other" (n=6).

Research Question Five: Is there a relationship between years of experience as a school psychologist and the number of cases of Tourette Syndrome or is there a relationship between years of experience and confidence working with students with Tourette Syndrome?

There was a moderate correlation between the years of experience and the number of cases involving students with TS, which was statistically significant. This result indicates that the more experience a school psychologist had, the more likely they were to have worked with students with TS. However, there was no relationship between school psychologists' confidence in assessment of TS and their years of experience as school psychologists.

Summary of the Findings

Overall, the data gathered in this study indicated that school psychologists were aware of TS and some of its characteristics. However, there was limited knowledge regarding comorbidity of TS, the assessment of TS, including tools available for assessment, appropriate counseling techniques, and research-based interventions. The 2 to 5% of school psychologists who indicated the use of research-based interventions is not surprising, given that most of the research-based interventions are conducted in clinical settings (e.g., Piacentini et al. (2010); Woods, Twohig, Flessner, & Roloff, 2003).

Study Limitations

There were several limitations to this study. Initially, the researcher hoped to have a maximum of 500 SP practicing in California participate in this study, with a minimum of 200. However, only 97 practicing SPs participated in this study. At the time of this study there were at least 1600 members of the California Association of School Psychologists (CASP), indicating a higher number of practicing SPs which, if more had participated, may have added a richer representation of school psychologists' training and knowledge of TS. Sending an email link inviting participants and having the link to the survey on the CASP website may have not been effective. The survey was sent out in the months of April 2015 and May 2015, which may not have been the best time considering that in those months many SPs are exceptionally busy with end of the year assessments and other work-related obligations. The researcher may have prepared and sent out the survey earlier in the school year, as well as contacted possible participants individually over the phone by gathering phone numbers for each school district throughout California, and attending the CASP convention in the Fall of 2014 and the Spring of 2015. Perhaps having a booth set up at the various CASP conventions with a couple of laptops would have gathered more participation in the survey. Also, a national sample may have provided greater representation and generalizability of the results.

Limitations were noted in the survey itself. A question was asked relating to interventions about research-based interventions. There were three answer options, which were "Habit Reversal Therapy," "Comprehensive Behavioral Intervention for

Tics," and "Other." When the participant chose "Other," there was no section available for the participant to indicate what other research-based interventions were used, given that there are not many research-based interventions available for children with TS. Another question that would have improved this study would have been to ask whether the participants who had provided HRT and CBIT to students with TS were trained in these research-based interventions. According to Capriotti, Himle, and Woods (2014), practitioners who conducted HRT and/or CBIT should be trained in those techniques.

Also, a question following research-based interventions may have been added to indicate what specific classroom interventions were being provided for children with TS. For example, are SPs advising teachers to allow students to exit the room to engage in tics in private, are they given more time to complete classroom assignments, given that research shows tics interrupt the attention of students with TS? On related note, there were no questions about the actual outcomes/effectiveness of the interventions.

Finally, a limitation noted in this study was that participant input on adequate training and confidence focused only on assessment and counseling. However, it would have been useful to inquire whether participants felt that they were adequately trained in TS as well as feeling confident in knowledge of TS overall.

Study Strengths

There currently is a very limited research base related to TS and the role of school psychologists. Therefore, perhaps one of the major strength of this study is the addition to the limited research on the roles of school psychologists in providing support to students with TS. Also, this study provides data indicating that, even though participants were familiar with characteristics of TS, the majority of respondents indicated that they

did not feel adequately trained in working with students with the disorder. Therefore, this study highlights the need for more adequate training of school psychologists in their training programs, as well as for professional development of those working in the field. More specifically, this study indicated the need to provide training for school psychologists' in the areas of assessment, counseling, and research-based interventions.

Directions for Future Research

Tourette Syndrome is a very complex disorder with many theories regarding its possible etiology. Even though professionals in the medical field have been aware of this disorder since the late 1800's, there continues to be limited research in research-based interventions necessary such as HRT and CBIT for students with TS to be successful and most of these interventions are solely used in the clinical setting. Even though research indicates that these interventions may be efficacious in a clinical setting, there is little research indicating that these interventions can be helpful in the school or whether they can be feasibly implemented. Therefore, researchers may want to focus on conducting studies on site at schools, with proper training of HRT and CBIT for school psychologists. Researchers should also consider implementing different types of classroom interventions in order to examine whether they will help students with TS.

There is limited research indicating the important role of school psychologists who may work with students with TS. This includes proper training of school psychologists in the areas assessment, counseling, interventions, and consultation. Researchers should consider focusing on creating or modifying proper tools designed to assess students with TS in the school setting, as well as provide research-based counseling methods, and interventions for school psychologists. Research could be

conducted on the role of school counselors and special educators in the assessment and treatment of TS. Finally, researchers could create web-based training to reach a wider audience and then evaluate the outcomes.

Implications

In this study, 88% of participants correctly identified TS characteristics on the short five question quiz about TS. However, the majority indicated that they did not feel adequately trained nor confident in assessment or counseling of TS. Despite most instruments being used in the clinical setting, questionnaires and observation tools should be accessible to school psychologists for the proper assessment of children with TS. Therefore, the implications of this study are that school psychologists may not be well trained regarding TS in their school psychology programs, and may not be receiving the needed professional development. These findings mirror those of other dissertation studies conducted on the East Coast regarding TS and school psychologists (Glassman, 2010; Masopust-Macchino, 2012).

Having well trained school psychologists can be an asset; especially being aware that TS often is comorbid with disorders such as ADHD and OCD, which can significantly affect a student's academic success both inside and outside of the classroom. The adequate training of school psychologists may help increase their confidence in working with students with TS. Their confidence may make the student comfortable, understood, and accepted. Training programs could increase the level of exposure of school psychologists in order to better identify students with TS. Also, in order to improve school psychologists' knowledge, state and national organizations could add early training in TS.

Conclusion

The purpose of this study was to examine the training and knowledge of school psychologists in California related to TS. Participants were asked five questions relating to the basic characteristics of TS to obtain a baseline of school psychologists' knowledge of basic TS characteristics. The training of school psychologists in the areas of assessment, counseling, and research-based interventions was also addressed, and indicated that the majority of respondents did not feel adequately trained in the assessment and counseling of individuals with TS. Of the 97 respondents, 24% (n=23) provided counseling services, but of those only 2% used curriculum specifically for students with TS. In regards to the use of research-based interventions, of the 97 participants, 29% (n=28) indicated that they provided interventions. However, when asked what types of interventions were provided, 5% (n=5) indicated they had used Comprehensive Behavioral Intervention for Tics (CBIT), 2% (n=2) indicated using Habit Reversal Training (HRT), and 3% (n=3) indicated using "Other" interventions.

This study highlighted the need to train school psychologists about TS and the needs of students in the classroom. Even though there were participants of varying education levels (e.g., Masters, Education Specialist, and Doctorate) who were trained in different educational institutions (e.g., California state university, University of California, and private universities), the majority felt poorly trained in TS and did not feel confident in providing support for students with TS, although this finding was not surprising given the lower prevalence of TS compared to other disorders such as ADHD. It is important for school psychologists to receive and/or seek out the proper training in all areas of TS, including etiology, medical interventions (e.g., medication), behavioral

therapies, counseling techniques, and proper tools for assessment. Because students are at school from three to six hours a day (depending on the grade level), school psychologists may help make a difference in children's lives by providing the proper supports necessary for student achievement, healthy mental and emotional wellbeing, and positive social experiences. It is incumbent upon school psychologists to gain the necessary training to provide appropriate service for students with TS.

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CHAPMAN UNIVERSITY INSTITUTIONAL REVIEW BOARD
NOTICE OF APPROVAL – RESEARCH WITH HUMAN PARTICIPANTS

TITLE OF STUDY: *A School Psychologists' Training and Knowledge of Tourette Syndrome*

PRINCIPAL INVESTIGATOR: **Randy Busse, Ph.D. (Faculty Advisor)**

STUDENT INVESTIGATOR: **Leticia Cornejo**

COLLEGE / DEPARTMENT: **College of Educational Studies - Counseling and School Psychology Program**

APPROVAL DATE: **12/16/2014**

EXPIRATION DATE: **12/15/2015**

REVIEW CATEGORY: **Expedited Category 7** [Research on individual or group characteristics or behavior or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.]

If there are any changes to the protocol during the approval period it is the principal investigator's responsibility to notify the IRB and obtain approval prior to implementing the changes.

FOR RESEARCH INVOLVING HUMAN SUBJECTS:
The Institutional Review Board has reviewed the proposed use of human subjects in the project identified above and has determined that:

a) The rights and welfare of the subjects are adequately protected; the risks are outweighed by potential benefits; the informed consent of human subjects will be obtained by methods that are adequate and appropriate.

b) Type of Consent: [ ] WRITTEN [ ] ORAL [X] PASSIVE* [ ] WAIVER

**Online survey will include passive consent.*

c) Research involves use of: [ ] Minors [ ] Students [ ] Disabled [ ] Existing Records
N/A [ ] Patients [ ] Elderly [ ] Pregnant Women

PRINCIPAL INVESTIGATORS PLEASE NOTE:
1. All unanticipated adverse events encountered during the conduct of the study must be reported in writing to the Institutional Review Board within 24 hours of the occurrence or knowledge of the event.
2. If modifications to the approved study are proposed, the Institutional Review Board must receive a Request for Modification and issue approval for the modification/s prior to initiation.
3. The principal investigator is responsible for retaining the original signed consent forms for 5 years after completion of the study.
4. All approved Informed Consent forms given to subjects must have the Institutional Review Board number and expiration date, and approval stamp visible on all pages of the form.

Signature: APPROVED CIPRIANI 12/17/14
Daniel Cipriani, PT, Ph.D., IRB Chair
Chapman University (FWA) 00011020, valid through: September 04, 2017

School Psychologists' Training and Knowledge of Tourette Syndrome

Thank you for taking time out of your busy schedule to participate in this survey. Your information is valuable for the field of school psychology. If you have any questions or comments, please contact Leticia Cornejo at corne101@mail.chapman.edu or Dr. Randy Busse at busse@chapman.edu.

You are being invited to participate in a research study. Participation in this study is completely anonymous and completion is voluntary. You may stop your participation at any time for any reason. Please read the information below and ask questions about anything that you do not understand.

PURPOSE:

The purpose of this study is to understand the training and knowledge of school psychologists in regards to assessment and interventions of Tourette Syndrome.

NUMBER OF PARTICIPANTS & HOW/WHERE TO ENROLL:

A minimum of 200 to a maximum of 500 practicing school psychologists. Participants will be supplied with a link to an online survey.

QUALIFICATION(S) TO PARTICIPATE:

To participate in this study you must be a practicing school psychologist in the state of California.

PROCEDURES:

You will be asked to answer demographic questions on your age, sex, ethnicity, education level, graduate school and years of experience in the field of school psychology. You then will be asked to complete a series of ratings about your training and knowledge relating to Tourette Syndrome. It is anticipated that you can complete the survey in approximately 20 minutes.

BENEFITS:

There are no direct benefits to you for your participation in the study. However, responses may provide more information regarding training and knowledge of school psychologists' with respect to Tourette Syndrome to the research community and to society.

RISKS:

There are no known personal risks for participating in anonymous survey research or for participating in this study.

PRIVACY & CONFIDENTIALITY:

There are no questions that can identify you personally. All responses will be completely anonymous, and kept in the locked office of the principal investigator or on a password-protected software located in a locked cabinet.

COMPENSATION, REIMBURSEMENT, COSTS:

Participants will not receive any reimbursement for participation in this study. There is no cost to participate.

CONTACT INFORMATION FOR QUESTIONS RELATED TO THE STUDY:

If you have any questions about the research or your participation in the study, please contact the Principal Investigator or a member of the research team listed at the top of this form.

TO REPORT A CONCERN:

If you would like to report a concern about the study or the informed consent process, you may contact Chapman University's Institutional Review Board, Office of Research and Sponsored Programs Administration by phone (714)-628-7392 or (714) 628-2805, by email at irb@chapman.edu, or by mail at Chapman University, ORSPA, One University Dr. Orange, CA 92866.

The purpose of this study is to understand the training and knowledge of school psychologists in regards to assessment and interventions for Tourette Syndrome.

There are 44 questions in this survey

Demographics

1 What is your gender? *

Please choose **only one** of the following:

- ○ Female
- ○ Male

2 What is your ethnicity? *

Please choose **only one** of the following:

- ○ White/European American
- ○ Black/African American
- ○ Hispanic/Latino American
- ○ Asian American
- ○ Pacific Islander
- ○ Native American
- ○ Other

3 What is your age? *

Please write your answer here:

4 What is your level of education? *

Please choose **only one** of the following:

- ○ Master's Degree
- ○ Education Specialist
- ○ Doctorate
- ○ Other

5 In what year did you obtain your highest degree? *

Please enter a date:

6 At what institution did you earn your degree? *

Please choose **only one** of the following:

- ○ Cal State
- ○ University of California
- ○ Private California University
- ○ Out of State Institution

7 How many years have you been employed as a school psychologist? *

Please write your answer here:

8 In what region of California are you employed? *

Please choose **only one** of the following:

- ○ Northern
- ○ Central
- ○ Southern

9 What size is the district in which you are currently employed? *

Please choose **only one** of the following:

- ○ less than 5,000
- ○ 5,001-50,000
- ○ 50,001-100,000
- ○ 100,001-500,000
- ○ 500,001-700,000
- ○ over 700,001

10 With which grade levels do you work? (check all that apply) *

Please choose **all** that apply:

- ☐ Preschool
- ☐ Elementary
- ☐ Middle School
- ☐ High School

11 Which of the following best describes the setting in which you are employed? *

Please choose **only one** of the following:

- ○ Rural
- ○ Urban
- ○ Suburban

12 What is the average household income level of families with whom you primarily work with?
*****

Please choose **only one** of the following:

- ○ Upper Socio-Economic Class
- ○ Upper Middle Socio-Economic Class
- ○ Middle Socio-Economic Class
- ○ Lower Socio-Economic Class

Short Quiz on Tourette Syndrome

13 Tourette Syndrome typically appears at birth. *

Please choose **only one** of the following:

- ○ True
- ○ False

14 A common tic found in children with Tourette Syndrome is rapid eye blinking. *

Please choose **only one** of the following:

- ○ True
- ○ False

15 Girls are at higher risk for Tourette Syndrome. *

Please choose **only one** of the following:

- ○ True
- ○ False

16 Children with Tourette Syndrome are more likely to develop Obsessive Compulsive Disorder (OCD). *

Please choose **only one** of the following:

- ○ True
- ○ False

17 Extremely frequent and intense tics result in sleep disturbance. *

Please choose **only one** of the following:

- ○ True
- ○ False

Tourette Syndrome Training

18 How many cases of Tourette Syndrome (TS) have you been involved in throughout your career as a school psychologist? *

Please write your answer here:

19 How many courses did you take in your school psychology program that touched upon TS? *

Please write your answer here:

20 Were you trained in the assessment of TS in your school psychology program? *

Please choose **only one** of the following:

- ○ Yes
- ○ No

21 How many hours of training were involved? *

Please choose **only one** of the following:

- ○ None
- ○ 1
- ○ 2
- ○ 3 or more

22 If you were trained, what assessment tools were you advised to use?

Please write your answer here:

23 Were you trained in counseling students with TS in your school psychology program? *

Please choose **only one** of the following:

- ○ Yes
- ○ No

24 How many hours of training were you provided? *

Please choose **only one** of the following:

- ○ None
- ○ 1
- ○ 2
- ○ 3 or more

25 Do you feel that the training you received in your school psychology program was adequate in the assessment of TS? *

Please choose **only one** of the following:

- ○ Yes
- ○ No

26 Are you confident assessing a student with TS? *

Please choose **only one** of the following:

- ○ Yes
- ○ No

Tourette Syndrome Knowledge

27 How would you rate your level of knowledge about the social deficits often present in TS? *

Please choose **only one** of the following:

- ○ Not at All
- ○ Very Little
- ○ Somewhat
- ○ Very

28 How would you rate your level of knowledge about the executive function deficits often present in TS? *

Please choose **only one** of the following:

- ○ Not at All
- ○ Very Little
- ○ Somewhat
- ○ Very

29 How would you rate your level of knowledge about the academic deficits associated with TS? *

Please choose **only one** of the following:

- ○ Not at All
- ○ Very Little
- ○ Somewhat
- ○ Very

30 If you feel at least somewhat knowledgeable about TS, from what source did you primarily learn about the disorder?

Please choose **all** that apply:

- ☐ University or College Training Program
- ☐ Workshops/Seminars
- ☐ Independent Study
- ☐ Parents of Children with TS
- ☐ Colleagues
- ☐ Internet Websites
- ☐ Other

Tourette Syndrome Experience

31 How many children diagnosed with Tourette Syndrome have you worked with in your capacity as a school psychologist (either through evaluation, case management, consultation, etc.)? *

Please write your answer here:

32 How many children with suspected Tourette Syndrome, who were not diagnosed, have you worked with in a capacity as a school psychologist (either through evaluation, case management, consultation, etc.)? *

Please write your answer here:

33 How many referrals have you received, since being a school psychologist, which were for assessment for a child with Tourette Syndrome? *

Please write your answer here:

34 If you have worked with student(s) with Tourette Syndrome, what types of tics did the student(s) present?

Please choose **all** that apply:

- ☐ Vocal
- ☐ Motor
- ☐ Motor and Vocal

35 If a student was not diagnosed with Tourette Syndrome, did you make a referral to a medical doctor and/or neurologist?

Please choose **only one** of the following:

- ○ Yes
- ○ No

36 If a referral was made but not to a medical doctor and/or neurologist, to whom was this student referred?

Please write your answer here:

37 Have you been involved in providing counseling services to a student[s] with Tourette Syndrome? *

Please choose **only one** of the following:

- ○ Yes
- ○ No

38 If you used Tourette Syndrome counseling curriculum, please list the curriculum you've used.

Please write your answer here:

39 If so, what techniques did you use during counseling sessions?

Please choose all that apply and provide a comment:

- [ ] Talk Therapy
- [ ] Solution Focused Therapy
- [ ] Cognitive Behavior Therapy (CBT)
- [ ] Tourette Syndrome Counseling Curriculum
- [ ] Other

40 Have you attempted research-based interventions?

Please choose **only one** of the following:

- ○ Yes
- ○ No

41 If so, which research-based interventions have you attempted?

Please choose all that apply and provide a comment:

- [ ] Habit Reversal Therapy
- [ ] Comprehensive Behavioral Intervention for Tics (CBIT)
- [ ] Other

42 Did most of the student(s) have social issues with peers?

Please choose **only one** of the following:

- ○ Yes
- ○ No

43 Did you provide classroom and/or school wide education about Tourette Syndrome?

Please choose **only one** of the following:

- ○ Yes
- ○ No

Thank you

44 Thank you for taking the time to complete this survey. Your participation and input are very valuable to the field of school psychology. Please feel free to comment. I look forward to hearing from you!

With Gratitude,
Leticia Cornejo
School Psychologist
Doctoral Candidate

Please write your answer here: